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Systematic and Biogeographic Studies on the Subfamily Cicadellinae from Korea (Homoptera: Cicadellidae)

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Abstract The present work revises all the known species of the subfamily Cicadellinae from Korea. A total of 41 species belonging to 14 genera under 5 tribes are arranged herein, of which 2 genera and 11 species are new to science: *Diodontophorus* gen. nov., *Koreotettix* gen. nov., *Koreotettix parvus* gen. et sp. nov., *Pagaronia chejuensis* sp. nov., *P. naejangsana* sp. nov., *P. pallida* sp. nov., *P. similis* sp. nov., *P. taeamsana* sp. nov., *P. umbratica* sp. nov., *P. bifurcata* sp. nov., *P. diversa* sp. nov., *P. elegans* sp. nov., and *P. maculipennis* sp. nov. And 2 new combinations are made: *Diodontophorus japonicus* comb. nov. and *Diodontophorus koreanus comb.* nov. The distribution of *Bathysmatophorus schabliovskii* is also confirmed in North Korea. Keys are given for all the taxa respectively, host plants and distributional data are also provided for each species. Faunistic characteristics of Korean taxa were analyzed to reveal the zoogeographic pattern.

Key words Systematics, biogeography, Homoptera, Cicadellidae, Cicadellinae, Korea

INTRODUCTION

Leafhoppers belonging to the subfamily Cicadellinae are widely distributed all over the zoogeographical regions of the world. They are associated with herbaceous plants predominantly inhabiting grasslands, bushes of forests, and sometimes cultivated areas.

Some species such as *Cicadella viridis* and *Bothrogonia japonica* are of economic importance attacking various cultivated crops, vegetables and fruit trees. Whereas, a few species are served as the vectors of plant diseases caused by viruses.

In Korea, the taxonomy of this group has been confused with many fragmentary reports. Although the records are numerous in various faunistic surveys on local insect fauna, as compared with other leafhoppers, many mistakes including erroneously placed taxa have been made simultaneously in the identification by previous authors.

Particularly, the domestic records on the species of *Pagaronia* and *Bathysmatophorus* (=error for *Diodontophorus* gen. nov.) given by the numerous authors were mostly incorrect, due to the superficial resemblance in external feature between the species of each genus. Nevertheless, there has been no substantial work of this group synthetically available, even if the primary classification system had been provided by Kwon (1983).

Thus, the purpose of this study is to reduce the existing identification problems and revise this group taxonomically to be useful to entomologists as a basic information for these leafhoppers.

HISTORICAL REVIEW

Previous contributions to the fauna of Korean Cicadellinae are numerous and very confusing with many mistakes. The first distributional record of the Korean Cicadellinae was made by Kirkaldy (1900) who listed *Tetigonia ferruginea* (=error for *Bothrogonia japonica*). Soon after, he (1901) also listed Korea in the distributional range of the same species. Subsequently, Oshanin (1906) recorded *Tettigonia ferruginea* (=error for *Bothrogonia japonica*) occurring in Korea. Again, he (1912) reported it as *Tettigoniella ferruginea* (=error for *Bothrogonia japonica*) with the same distributional record.

Shortly after, Matsumura (1915) described 2 new species, *Evacanthus aurautiacus* (sic, =*E. interruptus*) and *Ishidaella flaveola* (=*Kolla atramentaria*) on the basis of the specimens from Berg Chohaku (=Paektusan). In addition, he recorded the following 4 species from Korea: *Euacanthus acuminatus* (=*Evacanthus acuminatus*), *Ishidaella albomarginata* (=error for *Kolla atramentaria*), *Onukia onukii* and *Tylozygoides artemisiae* (=*Mileewa dorsimaculata*).

Later, Okamoto (1924a) listed *Tettigonia ferruginea apicalis* (=error for *Bothrogonia japonica*) from Quelpart island (=Chejudo). In the same year, he (1924b) also reported *Tettigonia viridis* (=*Cicadella viridis*), being injurious to rice plant in most of the provinces throughout Korea.

Then, Matsumura (1929) also listed *Tettigonia viridis* (=*Cicadella viridis*) as a pest of rice in Korea. He (1931) also illustrated *Ishidaella albomarginata* (=error for *Kolla atramentaria*) and *Tettigoniella viridis* (=*Cicadella viridis*), with including Korea in the distributional ranges.

Subsequently, Doi (1932) reported *Euacanthus interruptus* (=*Evacanthus interruptus*) occurring in Korea. Then, Kamijo (1933) recorded *Cicadella ferruginea apicalis* (=error for *Bothrogonia japonica*), *Tettigoniella viridis* (=*Cicadella viridis*), and *Ishidaella albomarginata* (=error for *Kolla atramentaria*) from Kyŏngbuk province. Again, Doi (1934) reported *Mileewa margheritae* (=*Mileewa dorsimaculata*) from Pyŏngyang.

While treating Chinese insects, Wu (1935) included the occurrence of *Cicadella ferruginea* (=error for *Bothrogonia japonica*) in Korea. Meanwhile, Cheo (1935) also listed *Cicadella ferruginea* (=error for *Bothrogonia japonica*) as a injurious pest of economic plants in China, giving with the distributional record of Korea.

Soon after, Masaki (1936) recorded *Cicadella ferruginea* (=error for *Bothrogonia japonica*) and *Cicadella viridis* based on the material collected from Kanghwado. Kamijo (1936) treated 2 species in his faunistic survey from Mokp'o: *Tettigoniella viridis* (=*Cicadella viridis*) and *Cicadella ferruginea* (=error for *Bothrogonia japonica*), as well.

Subsequently, Doi (1937) listed *Cicadella ferruginea* (=error for *Bothrogonia japonica*) from Tŏkjŏkto. In the meanwhile, Esaki *et al.* (1938) illustrated 4 species occurring in Korea along with Japanese species; *Onukia onukii, Mileewa margheritae* (=*M. dorsimaculata*), *Cicadella ferruginea* (=error for *Bothrogonia japonica*) and *Cicadella viridis*. At the same time, Nagaoka (1938) also reported *Cicadella viridis* from Myŏko (=Myohyangsan). Then, Esaki (1950) recorded Korea in the distributional ranges of *Cicadella ferruginea* (=error for *Bothrogonia japonica*), *Cicadella viridis, Mileewa margheritae* (=*M. dorsimaculata*), and *Onukia onukii*.

Later, Ishihara (1953) treated 4 Korean species in his check list of Cicadelloidea from Japan: *Ishidaella albomarginata* (=error for *Kolla atramentaria*), *Onukia onukii, Mileewa margheritae* (=*Mileewa dorsimaculata*) and *Evacanthus acuminatus*.

In the meantime, Esaki and Ito (1954) listed 9 Korean species with the host plants in their catalogue of Japanese leafhoppers: *Amblycephalus ferrugineus* (=error for *Bothrogonia japonica*), *A. albomarginatus* (=error for *Kolla atramentaria*), *A. flaveolus* (=*Kolla atramentaria*), *A. viridis* (=*Cicadella viridis*), *Epiacanthus stramineus, Mileewa margheritae* (=*M. dorsimaculata*), *Evacanthus aurantiacus*

(=*E. interruptus*), and *Onukia onukii*. Among them, *Epiacanthus stramineus* was firstly added to *Korean fauna*. In the same year, Hasegawa (1954) listed the occurrence of *Mileewa margheritae* (=*M. dorsimaculata*) in Korea, while treating Japanese species.

As the first survey made by Korean institute, For. Exp. Stat. Kor. (1959) reported *Cicadella ferrugines* (sic, =error for *Bothrogonia japonica*). Soon after, Kim (1960) listed *Cicadella ferruginea* (=error for *Bothrogonia japonica*) from Sŏraksan. Then, Kim (1961) reported *Cicadella ferruginea* (=error for *Bothrogonia japonica*) and *Cicadella viridis* from Chirisan. Cho (1963) recorded *Cicadella ferruginea* (=error for *Bothrogonia japonica*) from Chejudo.

Then, Ishihara (1963) reported the occurrence of *Onukia onukii* in Korea. Meanwhile, Lee (1963) introduced 5 species as insect pests of agricultural crops: *Cicadella felruginea* (sic, =error for *Bothrogonia japonica*), *Cicabella viridis* (sic), *Epiacanthus stramineus*, *Cicadella albomarginata* (=error for *Kolla atramentaria*), and *Mileewa margheritae* (=*M. dorsimaculata*). In the catalogue of Homoptera, Metcalf (1963a) listed 4 known species occurring in Korea: *Evacanthus acuminatus*, *E. interruptus*, *E. aurantiacus* (=*E. interruptus*) and *Onukia onukii*. Again, he (1965) subsequently recorded 6 known species occurring in Korea: *Mileewa margheritae* (=*M. dorsimaculata*), *Ishidaella albomarginata* (=error for *Kolla atramentaria*), *Tettigella semiglauca* (=*Kolla atramentaria*), *Ishidaella flaveola* (=*Kolla atramentaria*), and *Epiacanthus stramineus*.

Then, Ishihara (1965a) made illustrations of Japanese species, and included Korea in the distributional ranges of *Onukia onukii* and *M. margheritae* (=*M. dorsimaculata*). He (1965b) also recorded the occurrence of *Mileeva margheritae* (sic) in Korea. And he (1966) listed *Ishidaella albomarginata* (=error for *Kolla atramentaria*) and *Epiacanthus stramineus*, too. Ku (1966) listed *Cicadella viridis* from C. Korea. In the same year, Emel'yanov (1966) described a new species, *Euacanthus papilionifer* (=*Evacanthus ogumae*) based on the material collected from N. Korea.

While treating leafhoppers of economic importance in China, Kuoh (1966) listed 4 species occurring in Korea: *Evacanthus acuminatus*, *Tettigoniella ferruginea* (=error for *Bothrogonia japonica*), *Tettigoniella viridis* (=*Cicadella viridis*) and *T. albomarginata* (=error for *Kolla atramentaria*).

Again, Kim (1967) introduced *Cicadella ferruginea* (=error for *Bothrogonia japonica*) as a forest injurious insects from Chirisan. Educ. Min. (1967) also reported *Cicadella ferruginea* (=error for *Bothrogonia japonica*) from Sŏraksan. Ishihara (1967) recorded occurrence of *Tettigonia albomarginata* (=error for *Kolla atramentaria*) in Korea. Shortly after, Ku (1968) listed *Cicadella viridis* and *C. ferruginea* (=error for *Bothrogonia japonica*) from Myŏngjisan.

During this period, there had been great achievements that Zool. Soc. Kor. (1968) made a general list of Korean insects including cicadelline leafhoppers as: *Cicadella ferruginea* (=error for *Bothrogonia japonica*), *C. viridis*, *Mileewa margheritae* (=*M. dorsimaculata*), *Ishidaella albomarginata* (=error for *Kolla atramentaria*), *Ishidaella flaveola* (=*Kolla atramentaria*), *Tylozygoides artemisiae* (=*Mileewa dorsimaculata*), *Onukia onukii*, *Evacanthus acuminatus*, and *E. aurantiacus* (=*E. interruptus*). While, Cult. & Inf. Min. (1968) reported *Cicadella ferruginea* (=error for *Bothrogonia japonica*) from Hallasan, Chejudo.

As the first extensive survey on the auchenorhynchid fauna from the Russian Far East, Vilbaste (1968) listed the following 6 species occurring in Korea: *Ishidaella albomarginata* (=*Kolla atramentaria*), *Epiacanthus stramineus*, *Mileewa dorsimaculata*, *Evacanthus ogumae*, *E. interruptus*, and *Onukia onukii*.

After this, Hyun and Woo (1969) also listed *Cicadella ferruginea* (=error for *Bothrogonia japonica*), *Ishidaella albomarginata* (=error for *Kolla atramentaria*) and *Mileewa margheritae* (=*M. dorsimaculata*). Ko (1969) recorded 4 known species in his list of forest insects in Korea: *Bothrogonia* (*Cicadellla*) ferruginea (=error for *B. japonica*), *Cicadella viridis*, *Ishidaella albomarginata* (=error

for *Kolla atramentaria*), and *Epiacanthus stramineus*.

On the other hand, there had been published a check list of insects from North Korea by Chu (1969), as a native N. Korean, who also treated the following 5 cicadelline leafhoppers as: *Cicadella ferruginea* (=error for *Bothrogonia japonica*), *Cicadella viridis*, *Epiacanthus stramineus Meileewa margheritae* (=*Mileewa dorsimaculata*), and *Onukia onukii*.

It is noteworthy that Anufriev (1970) described 4 new species of *Pagaronia*. Among them, *Pagaronia continentalis* was based on the specimens collected from several parts of N. Korea. While, Seok (1970) recorded *Cicadella ferruginea* (=error for *Bothrogonia japonica*) from Is. Quelpart (=Chejudo). Kim *et al.* (1971) reported *Tettigella viridis* (=*Cicadella viridis*) from Is. Ulreung (=Ullŭngdo). Simultaneously, Kim and Kim (1971) reported the following 4 species from Sogŭmgang and Odaesan: *Bothrogonia japonica*, *Tettigella viridis* (=*Cicadella viridis*), *Kolla atramentaria* and *Bathysmatophorus linnavuorii* (=error for *Diodontophorus koreanus* comb. nov.).

In the meantime, Ishihara (1971) included Korea in the distributional range of *Kolla atramentaria*. At the same year, Anufriev (1971) described a new species, *Pagaronia koreana* based on the material collected from Myohyang Mts. (=Myohyangsan).

Also, Lee (1971) listed 5 known species throughout Korea: *Bothrogonia japonica*, *Tettigella viridis* (=*Cicadella viridis*), *Onukia onukii*, *Mileewa margheritae* (=*M. dorsimaculata*), and *Epiacanthus guttigera* (=error for *Pagaronia continentalis*). Then, Kim and Kim (1972a) reported *Bothrogonia japonica* and *Bathysmatophorus linnavuorii* (=error for *Diodontophorus koreanus* comb. nov.) from Kuch'ŏndong, Muju-gun. They (1972b) also listed *Bothrogonia japonica* from Taedunsan Haenam-gun.

Whereas, Emel'yanov (1972) recorded Korea in the distributional range of *Kolla albomarginata* (=error for *K. atramentaria*) and *Mileewa dorsimaculata* as insect pests of agricultural crops. During the same time, an important revisionary catalogue was prepared by Nast (1972), who listed the following 13 known species from Korea: *Onukia onukii*, *Evacanthus acuminatus*, *E. aurantiacus* (=*E. interruptus*), *E. interruptus*, *E. ogumae*, *Bothrogonia ferruginea* (=error for *B. japonica*), *Pagaronia continentalis*, *P. koreana*, *Epiacanthus stramineus*, *Cicadella atramentaria* (=*Kolla atramentaria*), *C. flaveola* (=*Kolla atramentaria*), *C. viridis*, and *Mileeva dorsimaculata* (sic).

While, Kor. Soc. Plant Prot., (1972) listed 5 species in the catalogue of Korean insect pests: *Cicadella ferruginea* (=error for *Bothrogonia japonica*), *C. viridis*, *Epiacanthus stramineus*, *Kolla atramentaria*, *Mileewa margheritae* (=*M. dorsimaculata*).

For the fauna of N. Korea, Dworakowska (1973) recorded *Bothrogonia ferruginea* (=error for *B. japonica*), and *Mileewa dorsimaculata*, based on the material collected from numerous sites during the Polish expedition to N. Korea. Subsequently, Kim and Kim (1974) reported *Tettigella viridis* (=*Cicadella viridis*) from Naejangsan. Kim *et al.* (1975) reported *Bothrogonia japonica*, *Tettigella viridis* (=*Cicadella viridis*), and *Bathysmatophorus linnavuorii* (=error for *Diodontophorus koreanus* comb. nov.) from the vicinity of D.M.Z. area. After then, Kim *et al.* (1976) also recorded *Bothrogonia japonica* and *Tettigella viridis* (=*Cicadella viridis*) from Ch'iaksan.

As specialists working on Auchenorrhyncha, Lee and Kwon (1976) listed *Bothrogonia japonica* and *Tettigella viridis* (=*Cicadella viridis*) from Chuwangsan. Simultaneously, Lee et al. (1976) reported the above 2 known species collected from C. and S. Korea.

Meanwhile, Anufriev (1976) reported the occurrence of *Epiacanthus stramineus* in Korea. In the next year, Kim and Nam (1977) also reported *Bothrogonia ferruginea* (=error for *B. japonica*) and *Tettigella viridis* (=*Cicadella viridis*) from Chogyesan. As the first substantial survey on this group in Korea, Lee and Kwon (1977) listed the following 14 species: *Epiacanthus guttigera* (=error for *Pagaronia continentalis*), *E. stramineus*, *Bathysmatophorus japonicus* (=*Diodontophorus japonicus*

comb. nov.), *B. shabliovskii* (=error for *Diodontophorus koreanus* comb. nov.), *Evacanthus interruptus, E. acuminatus. E. aurantiacus* (=*E. interruptus*), *E. okumai* (sic), *Bothrogonia japonica, Kolla atramentaria, K. hyalina* (=*K. atramentaria*), *Tettigella viridis* (=*Cicadella viridis*), *T. flaveola* (=*K. atramentaria*) and *Mileewa dorsimaculata.* Soon after, Kim and Nam (1978) reported *Bothrogonia japonica* and *Tettigella viridis* from Imgye-myŏn.

Particularly, Kwon and Lee (1978) revised the genus *Pagaronia* of the Palaearctic region adding a new subgenus, *Parapagaronia* and 3 new species: *P.* (*Parapagaronia*) *hallasana, P.* (*Parapagaronia*) *seungmoi*, and *P.* (*Parapagaronia*) *evansi*. While, Lee (1979) reported the following 5 species from Wŏraksan and Choryŏng: *Bothrogonia japonica, Cicadella viridis, Kolla hyalina* (=*K. atramentaria*), *K. atramentaria, Mileeva dorsimaculata* (sic).

As a revisionary study on the Cicadellidae fauna from the Russian Far East, Anufriev (1978) listed the following 5 species occurring in Korea: *Mileewa dorsimaculata, Onukia onukii, Evacanthus* (*Paracanthus*) *ogumae, Epiacanthus stramineus* and *Pagaronia continentalis.*

For the standard taxonomic work, Lee and Kwon (1979) published a check list of Auchenorrhyncha from Korea, and among them 19 cicadelline species were documented: *Onukia onukii, Evacanthus acuminatus, E. aurantiacus* (=*E. interruptus*), *E. interruptus, E. ogumae, Bathysmatophorus shabliovskii* (=partim, error for *Diodontophorus koreanus* comb. nov.), *B. japonicus* (=*Diodontophorus japonicus* comb. nov.), *Pagaronia* (*Pagaronia*) *continentalis, P.* (*Parapagaronia*) *hallasana, P.* (*Parapagaronia*) *koreana, P.* (*Parapagaronia*) *seungmoi, P.* (*Parapagaronia*) *evansi, Epiacanthus stramineus, Bothrogonia japonica, Kolla semiglauca* (=*K. atramentaria*), *K. hyalina* (=*K. atramentaria*), *K. flaveola* (=*K. atramentaria*), *Cicadella viridis,* and *Mileewa dorsimaculata.*

Later, Yoon and Nam (1980a) recorded *Cicadella ferruginea* (=error for *Bothrogonia japonica*), *C. viridis* from Myŏngjisan. Simultaneously, they (1980b) also reported *Tettigella viridis* (=*Cicadella viridis*) from Ch'ilgapsan.

As one of the serial works on the taxonomy of the genus *Pagaronia*, Kwon and Lee (1980a) described *Pagaronia whangaksana* and *P. jungsukae* as new to science, which collected from Hwangaksan and Namhaedo respectively. Again, they (1980b) added 2 new species of *Pagaronia* from Far East Asia, and one of them, *P. geojedoensis* was collected from Kŏjedo.

In addition, Choe (1980) also described 3 new species of *Pagaronia* from C. and S. Korea: *P. kumsanensis* (=*P. jungsukae*), *P. heuksanensis,* and *P. hamatus* (=*P. hamata*). Then, Park (1981) recorded *Cicadella ferruginea* (=error for *Bothrogonia japonica*) from Namhaedo. In the same year, Lee and Kwon (1981) reported *Cicadella viridis* and *Pagaronia continentalis* from Ullŭngdo. Subsequently, Kwon (1981) added 2 new species of *Pagaronia* collected from S. Korea: *P.* (s. str.) *silvatica* and *P.* (*Parapagaronia*) *jirisana.* Further, he treated *P. kumsanensis* as a junior synonym of *P. jungsukae.*

In the meantime, Ossiannilsson (1981) included Korea in the distributional range of *Evacanthus interruptus.* Chang and Choe (1981) recorded *Bothrogonia japonica* from Kyeryongsan, while Park and Kim (1982) also reported *B. japonica* from Chirisan. Again, Kim and Chang (1982) listed it from Pogildo and Chagaedo. In the same year, Kim and Nam (1982) reported 2 species, *Bothogonia japonica* (sic) and *Cicadella riridis* (sic) from Seoul. Then, Nam and Kim (1982) also reported *B. japonica* and *Mileewa margheritae* (=*M. dorsimaculata*) from Chirisan.

In his supplement to the previous Palaearctic catalogue, Nast (1982) listed 6 species of Korean *Pagaronia*: *P. geojedoensis, P. junsukae, P. whangaksana, P.* (*Parapagaronia*) *evansi, P.* (*Parapagaronia*) *hallasana,* and *P.* (*Parapagaronia*) *seungmoi.*

As the first revisionary survey, Kwon (1983) arranged 30 species of Korean Cicadellinae, including 5 new species: *Pagaronia seolagsana, Bathysmatophorus koreanus* (=*Diodontophorus koreanus*

com. nov.), *Malmaemichungia brachycephala, Bannalgaechungia alticola* and *B. hanlasana.* He also added *Mileewa ussurica* and *Kurotsuyanus sachalinensis* in the distributional range from Korea. In addition, he proposed either 2 new tribes or genera respectively: Bothrogoniina, Malmaemichungiina, *Malmaemichungia* and *Bannalgaechungia.* Moreover, he suppressed either *Kolla hyalina* along with *Ishidaella flaveola* under the junior synonymy of *Kolla atramentaria* or *Euacanthus aurantiacus* under that of *Evacanthus interruptus*, respectively.

For the local fauna again, Kim and Nam (1984) reported 9 known species from Sŏraksan: *Onukia onukii, Evacanthus acuminatus, E. inturruptus, E. ogumae, Pagaronia continentalis, Bothrogonia japonica, Kolla semiglauca* (=*K. atramentaria*), *Cicadella viridis,* and *Mileewa dorsimaculata.* Meanwhile, Kim (1984) listed *Bothrogonia japonica, Cicadella viridis,* and *Pagaronia continentalis* (=error for *P. geojedoensis*) from Chejudo. But, the last species is often confused with other allies of the genus by the external similarity.

Then, Kim and Nam (1984a) recorded *Cicadella viridis* from Chŏmbongsan. They (1984b) also reported 9 species from Sŏraksan: *Onukia onukii, Evacanthus acuminatus, E. interruptus, E. ogumae, Pagaronia continentalis, Bothrogonia japonica, Kolla semiglauca* (=*K. atramentaria*), *Cicadella viridis,* and *Mileeva dorsimaculata* (sic).

Soon after, Kim *et al.* (1985) reported the following 5 species from Chuwangsan: *Bothrogonia japonica, Cicadella viridis, Onukia onukii, Kolla atramentaria,* and *Mileewa dorsimaculata.* In the meantime, Lee *et al.* (1985) listed the following 9 species from Hallasan, Chejudo, accompanied by the same identification error as in Kim's (1984) occasion: *Bothrogonia japonica, Cicadella viridis, Epiacanthus guttigera* (=error for *Pagaronia geojedoensis*), *Evacanthus interruptus, E. ogumae, Kolla hyalina* (=*K. atramentaria*), *Onukia onukii, Pagaronia continentalis* (=error for *P. geojedoensis*) and *P. hallasana.*

Subsequently, Park and Cho (1986) recorded *Bothogonia japonica* (sic) from Hwangsŏksan. Meanwhile, Kor. Soc. Plant Prot. (1986) provided a list including 9 species as Korean insect pests: *Cicadella viridis, Bathysmatophorus japonicus* (=*Diodontophorus japonicus* comb. nov.), *B. koreanus* (=*Diodontophorus koreanus* comb. nov.), *B. shabliovskii* (=partim, error for *Diodontophorus koreanus* comb. nov.), *Epiacanthus stramineus, Bothrogonia japonica, Kolla atramentaria, Mileeva dorsimaculata* (sic), *Onukia onukii.*

Then, Park (1987) reported *Tettigella viridis* (=Cicadella viridis) and *Bothrogonia japonica* from DMZ area. Again, Park and Park (1987) reported *Cicadella viridis* and *Bothrogonia japonica* from Tosolsan and Hwach'ŏn, respectively. Simultaneously Ra *et al.*, (1987) listed *Cicadella viridis* and *Ishidaella flaveola* (=*Kolla atramentaria*) from Hŭksan'gundo.

At the same time, Kim and Chang (1987) treated the following 4 species from T'aebaeksan: *Evacanthus ogumae, Pagaronia continentalis, Bothrogonia japonica* and *Cicadella viridis.* In the next year, Park *et al.* (1988a), listed 5 species, *Cicadella viridis, Evacanthus acuminatus, E. ogumae, Millewa dorsimaculata* (sic), and *Pagaronia* (s. str.) *continentalis* from Taeamsan. They (1988b) also listed *Bothrogonia japonica* and *Tettigella viridis* (=*Cicadella viridis*) from Sogŭmgang.

In the meantime, Anufriev and Emel'yanov (1988) made an updated key to the species of Cicadellinae from Russian Far East, and included Korea in the distributional range of the following 7 species: *Onukia onukii, Evacanthus* (*Paracanthus*) *ogumae, Epiacanthus stramineus, Pagaronia continentalis, Mileewa dorsimaculata* and *Kolla atramentaria.* Whereas, they included *Oniella koreana* into Evacanthini. It has been placed in the genus *Nirvana* of Nirvaninae by the previous authors, but it may need more comprehensive review with the Nirvaninae, because the genitalic characters are very similar between Nirvaninae and Evacanthini, though the general body size as well as shape is rather different. At any rate, *Oniella koreana* was not included in the present subfamily Cicadellinae followed by

the other authors' traditional classification system in this work.

As the first numerical taxonomic work on this Korean subfamily, Yoon (1989) conducted a morphometric multivariate analysis for the 7 species of the nominative subgenus *Pagaronia* from Korea. While editing Japanese insect lists, Morimoto (1989) recorded the following 5 species occurring in Korean peninsula: *Evacanthus interruptus, Onukia onukii, Epiacanthus stramineus, Kolla atramentaria,* and *Mileewa dorsimaculata.*

While compiling supplementary catalogue for world leafhopper fauna, Oman *et al.* (1990) listed *Bannalgaechungia alticola* and *Malmaemichungia brachycephala* from Korea.

Recently, Hwang et al. (1991) reported *Bothrogonia japonica,* and *Pagaronia continentalis* from Pyŏnsanbando, but the voucher specimens of the latter species apparently needs confirmation through the examination of the male genitalia.

Then, Kim and Lee (1991) also recorded *Bothogonia japonica* (sic), *Cicadella viridis* and *Pagaronia seunsmoi* (sic, unknown species) from Suwŏn. While, For. Adm. For. Res. Inst. (1991) illustrated *Bothrogonia japonica* as a forest pest in Korea.

As a great achievements Ent. Soc. Kor. & Kor. Soc. Appl. Ent. (1994) made a check list of insects from Korea, and among them 31 cicadelline species were documented: *Evacanthus (E.) acuminatus, E. (E.) interruptus, E. (Paraacanthus) ogumae, Oniella koreana, Onukia onukii, Bannalgaechungia alticola, B. hanlasana, Malmaemichungia brachycephala, B. japonicus* (=*Diodontophorus japonicus* comb. nov.), *B. koreanus* (=*Diodontophorus koreanus* comb. nov.), *B. shabliovskii, Epiacanthus stramineus, Kurotsuyanus sachalinensis, Pagaronia (P.) continentalis, P. (P.) geojedoensis, P. (P.) heuksanensis, P. (P.) jungsukae, P. (P.) seolagsana, P. (P.) silvatica, P. (P.) whangaksana, P. (Parapagaronia) evansi, P. (Parapagaronia) hallasana, P. (Parapagaronia) hamata, P. (Parapagaronia) jirisana, P. (Parapagaronia) koreana, P. (Parapagaronia) seungmoi, Bothrogonia japonica, Cicadella viridis, Kolla atramentaria, Mileewa (Elemia) ussurica,* and *M. (M.) dorsimaculata.*

Consequently, prior to the present survey 31 species have been reported as correctly all together to the Korean fauna as reviewed above (Table 1).

MATERIALS AND METHODS

The present classification work was based on more than 3,000 specimens of the Cicadellinae collected from various domestic localities throuhgout Korea, which are now deposited in the Systematic Entomology Laboratory, Department of Agricultural Biology, Kyungpook National University, Taegu, Korea (KPNU). A few available specimens were also checked from Department of Entomology, Agricultural Science Institute, Office of Rural Development Administrations, Suwŏn, Korea (ORDA); Division of Entomology, National Science Museum, Taejŏn, Korea (ENSM); Institute of Zoology, Academia Sinica, Beijing, China (ASBC), Centre for Land and Biological Resources Research, Ottawa, Canada (CNCO), and Slovakia Natural History Museum (SNHM) for the comparative survey.

Numerous field collecting surveys were also made domestically using with sweeping or beating net methods. Many of specimens available bear a minimum of collection data such as the locality, date and host-plant information.

All the collected domestic localities were listed here. The administrative geographical names of Republic of Korea and M.R.-Romanization were adopted for notation, but the provinces were abbreviated as follows for convenience.

CB : Ch'ungch'ŏngbukto HH : Hwanghaedo
CN : Ch'ungch'ŏngnamdo HN : Hamgyŏngnamdo
GB : Kyŏngsangbukto JB : Chŏllabukto

Table 1. A synopsis of the first records of cicadelline species from Korean fauna (all valid species are represented in bold, described as new species are marked with*).

Year	Author	Species
1900	Kirkaldy	*Tetigonia ferruginea* (=error for *Bothrogonia japonica*)
1915	Matsumura	*Euacanthus aurautiacus** (sic, =*Evacanthus interruptus*, syn. by Kwon, 1983)
		*Ishidaella flaveola** (=*Kolla atramentaria*, syn. by Kwon, 1983)
		Euacanthus acuminatus (=*Evacanthus acuminatus*)
		Ishidaella albomarginata (=error for *Kolla atramentaria*)
		Onukia onukii
		Tylozygoides artemisiae (=*Mileewa dorsimaculata*, syn. by Esaki & Hashimoto, 1935)
1936	Masaki	*Cicadella viridis*
1954	Esaki & Ito	*Epiacanthus stramineus*
1966	Emel'yanov	*Euacanthus papilionifer* (=*Evacanthus ogumae*, syn. by Vilbaste, 1968)
1970	Anufriev	*Pagaronia continentalis**
1971	Kim & Kim	*Bathysmatophorus linnavuorii* (=error for *Diodontophorus koreanus*)
1971	Lee	*Epiacanthus gettigera* (=error for *Pagaronia continentalis*)
1971	Anufriev	*Pagaronia koreana**
1977	Lee & Kwon	*Bathysmatophorus japonicus* (=*Diodontophorus japonicus*)
1978	Kwon	*Pagaronia (Parapagaronia) hallasana**
		*Pagaronia (Parapagaronia) seungmoi**
		*Pagaronia (Parapagaronia) evansi**
1980	*Kwon & Lee*	*Pagaronia whangaksana**
		*Pagaronia jungsukae**
1980	Kwon & Lee	*Pagaronia geojedoensis**
1980	Choe	*Pagaronia heuksanensis**
		*Pagaronia hamata**
		*Pagaronia kumsanensis** (=*Pagaronia jungsukae*, syn. by Kwon, 1981)
1981	Kwon	*Pagaronia* (s. str.) *silvatica**
		*Pagaronia (Parapagaronia) jirisana**
1983	Kwon	*Mileewa ussurica*
		Kurotsuyanus sachalinensis
		Pagaronia (s. str.) *seolagsana**
		*Malmaemichungia brachycephala**
		*Bannalgaechungia alticola**
		*Bannalgaechungia hanlasana**

GG : Kyŏnggido
GN : Kyŏngsangnamdo
GW : Kangwŏndo
HB : Hamkyŏngbukto
JJ : Chejudo
JN : Chŏllanamdo
PB : P'yŏnganbukto
PN : P'yŏngannamdo

Observations and drawings of the leafhopper specimens were made either with a stereoscopic microscope (Olympus SZH) or a compound microscope (Olympus BH), both installed with camera lucidas.

The classification system adopted and followed here is mainly after Anufriev and Emel'yanov (1988). The terms for the morphological characters accepted to the present survey are in accordance with the common usage in leafhopper systematics as revised and illustrated by Kwon (1988). Some exceptions of little known characters are defined here when necessary.

To examine genitalic characters, both male and female abdomen need to be removed from the thorax. Before removal of the abdomen, the insect body must be softened. To achieve this each

individual was dipped in 95-98% ethyl alcohol for 2-3 seconds, and then placed in distilled water for 5-10 minutes.

Once softened, the abdomen can be separated from the thorax by inserting a minute pin in the groove behind the hind coxae and gently pushing it dorsally while holding the thorax with forceps until the membraneous connections between 1st tergite and thorax are severed. Then, the abdomen was cleaned by the double bath-10% KOH soak method for 10-15 minutes.

Sometimes staining or decoloring is needed for the better observations. For the staining, 1-2 drops of chlorazol black E in 70% ethyl alcohol were added before the heating with KOH. And for the decoloring, the abdomen was dipped into the solution of sodium hypochloride (NaClO, efficiency: up to 4%) for 2-5 minutes.

Subsequently the abdomen was washed in distilled water, and may be transferred into a small watch glass filled with a modified Hood's solution (75% ethyl alchol 70 parts: glycerine 25: glacial acetic acid 5) for further dissection. The other manipulation and procedures used here were followed Kwon's method (1988).

SYSTEMATICS

Key to tribes of Korean Cicadellinae

1. Ocelli nearer to hind margin of vertex than to anterior margin, prominent ····· 2
− Ocelli not nearer to hind margin of vertex than to anterior margin, prominent or rarely absent ··· 3
2. Clavi of fore wings well developed and exceeding half of fore wing length, appendices narrow ····· Cicadellini
− Clavi of fore wings reduced and less than half of fore wing length, appendices wide ····· Mileewanini
3. Frontoclypeus with a median carina ····· Evacanthini
− Frontoclypeus without a median carina ····· 4
4. Antennal ledge obscurely round. Both sexes always macropterous ····· Pagaroniini
− Antennal ledge sharp, distinct. Females usually brachypterous, males macropterous or brachypterous ····· Errhomenini

1) Tribe Evacanthini Crumb, 1911 관매미충족

Key to genera of Evacanthini

1. Vertex with anterior margin acutely produced, distinctly longer than pronotum mesally ····· *Onukia*
− Vetex with anterior margin roundly produced, as long as or slightly shorter than pronotum mesally ····· *Evacanthus*

Genus 1. *Evacanthus* Le Peletier et Serville, 1825 관매미충속 (Fig. 1)

Evacanthus Le Peletier et Serville, 1825: 612.
Type-species. *Cicada interrupta* Linnaeus, 1758 (Europe).
Euacanthus Burmeister, 1835: 116.
Type-species. *Cicada interrupta* Linnaeus, 1758 (Europe).

Key to species of *Evacanthus*

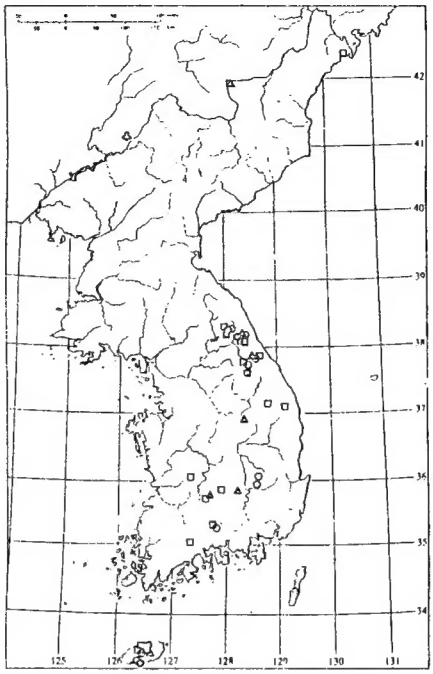

Fig. 1. Distributioin map of *Evacanthus* (black: locality based on the specimen examined, blank: locality reported previously; ○ *E. acuminatus*, △: *E. interruptus*, □: *E. ogumae*, ♧: Chinese new record of *E. interruptus*).

1. Head usually as wide as or slightly wider than pronotum, obtuse anteriorly. Males macropterous or submacropterous, females submacropterous. Aedeagus with a pair of lateral processes (subgenus *Evacanthus*) ····· 2
− Head apparently narrower than pronotum, subconically rounded anteriorly. Both sexes macropterous. Aedeagus without lateral processes, but with terminal processes only (subgenus *Paracanthus*) ····· *ogumae*
2. Pronotum with 3 longitudinal dark bands or spots, often fused with one another. Hind tibiae with 10-11 macrosetae. Lateral processes of aedeagus without denticles ····· *acuminatus*
− Pronotum with 2 lateral spots varying in size, sometimes coalescing. Hind tibiae with 8-9 spurs. Lateral processes of aedeagus with denticles ····· *interruptus*

Subgenus *Evacanthus* Le Peletier et Serville, 1825 관매미충아속

Evacanthus Le Peletier et Serville, 1825: 612.
Type-species. *Cicada interrupta* Linnaeus, 1758 (Europe).

1. *Evacanthus* (*Evacanthus*) *acuminatus* (Fabricius, 1794) 관매미충

Cicada acuminata Fabricius, 1794: 36 (Germany).
Cicada acuminalis Turton, 1802: 593 (Germany).
Cicada interstincta Fállen, 1806: 16 (Sweden).
Amblycephalus germari Curtis, 1833: 192 (Great Britain).
Evacanthus orbitalis Fitch, 1851: 57 (New York).

Euacanthus acuminatus: Matsumura, 1915: 156, 183 (Korea). —: Ishihara, 1953: 17 (Korea). —: Esaki et Ito, 1954: 45-47 (Korea). —: Metcalf, 1963: 12-24 (Korea). —: Kuoh, 1966: 51, fig. 33 (Korea). —: Zool. Soc. Kor., 1968: 30 (Korea). —: Nast, 1972: 246 (Korean peninsula). —: Lee et Kwon, 1977: 82 (Korea). —: Lee et Kwon, 1979: 298-299, pl. 17, figs. 84(a-c), 172-174, app. 833-834[1-4]. —: Kim et Nam, 1984: 311[5]. —: Park *et al.*, 1988: 166[6].
Evacanthus (s. str.) *acuminatus*: Kwon, 1983: 17 (Korea).
Evacanthus (*Evacanthus*) *acuminatus*: Kwon et Huh, 1994: 85 (Korea).

Locality. GB: P'algongsan, Sobaeksan (=Mt. Sobaek[3]); GN: Chirisan, Kayasan (=Mt. Kaya[4]); GW: Kyebangsan, Odaesan (=Mt. Odae[2]), Sŏraksan[5] (= Mt. Seolak[1]), Taeamsan[6]; JJ: Chungmun, Hallasan.

Disribution. Korea (North, Central, South, Chejudo), China (Taiwan), Japan (Honshu), Afghanistan, Mongolia, C.I.S. (Altai Mts., Armenia, Azerbaijan, Caucasus, Georgia, Kazakhstan, Khabarovsk Territory, Latvia, Maritime Territory, Moldavia, N. & M. Siberia, N. & M. Russia, Ukraine), Europe.

Host plant. Compositae (*cf.* Kwon, 1983).

2. *Evacanthus* (*Evacanthus*) *interruptus* (Linnaeus, 1758) 날개무늬관메미충

Cicada interrupta Linnaeus, 1758: 438 (Europe).
Cicada bicordata Scopoli, 1763: 114, fig. 334 (Yugoslavia).
Cicada hemiptera Piller et Mitterpacher, 1783: 39, pl. IX, fig. 7 (Yugoslavia).
Cicada moesta Zetterstedt, 1828: 521 (Sweden).
Euacanthus nigroflavus Stål, 1858: 197 (Siberia).
Euacnthus interruptus xanthus Melichar, 1896: 179 (Europe).
Euacanthus sibiricus Melichar, 1900: 43 (Siberia).
Euacanthus nigricans Matsumura, 1911: 20 (Japan).
Euacnthus miyakei Matsumura, 1911: 21 (Sakhalin).
Euacanthus nigricans pallidus Matsumura, 1912: 39 (Japan).
Euacanthus svaneticus Melichar, 1913: 327, fig. 4 (Caucasus).
Euacanthus aurautiacus (sic) Matsumura, 1915: 172 (Korea).
Euacanthus aurantiacus: Matsumura, 1915: 156-183[1]
Euacanthus interruptus rubescens Haupt, 1925: 12 (Germany).
Euacanthus striatus Kusnezov, 1929: 173 (Siberia).
Euacanthus interruptus: Matsumura, 1932: 68, 101, pl. 18, fig. 22 (Korea).
Evacanthus aurantiacus: Esaki et Ito, 1954: 47[2]. —: Zool. Soc. Kor., 1968: 30.
Evacanthus interruptus+*Evacanthus aurantiacus:* Metcalf, 1963: 24, 26-40 (Korea). —: Vilbaste, 1968: 121 (Korean peninsula). —: Nast, 1972: 246 (Korean peninsula). —: Lee et Kwon, 1977: 82[3-7]. —: Lee et Kwon, 1979: 299-301, pl. 17, figs. 86(a,b), 174-178, app. 834-837[8-12].
Evacanthus interruptus: Ossiannilsson, 1981: 385 (Korean peninsula). —: Kim et Nam, 1984: 311[13]. —: Lee *et al.*, 1985: 368[14]. —: Morimoto, 1989: 99 (Korean peninsula). —: Kim, 1993: 298[15].
Evacanthus (s. str.) *interruptus*: Kwon, 1983: 17 (Korea).
Evacanthus (*Evacanthus*) *interruptus:* Kwon et Huh, 1994: 85 (Korea).

Locality. GB: Sobaeksan[4] (=Mt. Sobaek[8]); GN: Kayasan (=Haeinsa Temple[3], Haein Temple[12]); GW: Odaesan[5] (=Mt. Odae[9]), Sŏraksan[13] (=Mt. Seolaksan[6], Mt. Seolak[10]); HB: Paektusan (=Berg Chohaku[1], Mt. Chohaku[2]); JB: Tŏgyusan (=Mt. Teokyusan[7], Mt. Teogyu[11]); JJ: Chejudo[15], Hallasan (= Mt. Halla[14]); China: 3 Ind., Jian, Jilin, 5, VII, 1993.

Distribution. Korea (North, Central, South, Chejudo), China (Sichuan, Jilin: new record), Japan (Hokkaido, Honshu, Kyushu, Shikoku), Mongolia, C.I.S. (Altai Mts., Estonia, Georgia, Kamchatka, Ka-

zakhstan, Kirghizia, Kurile, Lativa, Maritime Territory, Moldavia, Sakhalin, M. & W. Siberia, N. & M. Russia), Europe, N. Africa, N. America.

Host plant. Compositae (*cf.* Kwon, 1983), *Rubus idaeus* (*cf.* Törmälä & Raatikainen, 1976), hop (*cf.* Massee, 1943).

Subgenus *Paracanthus* Anufriev, 1978 오구마관매미충아속

Paracanthus Anufriev, 1978: 63.

Type-species. *Evacanthus ogumae* (Matsumura, 1911) (Sakhalin).

3. *Evacanthus* (*Paracanthus*) *ogumae* (Matsumura, 1911) 오구마관매미충

Euacanthus ogumae Matsumura, 1911: 21-22 (Sakhalin).

Euacanthus papilionifer Emel'yanov, 1966, Ent. Rev. 45(1): 54-55, figs. 9-10[1].

Evacanthus ogumae: Vilbaste, 1968: 121 (Korean peninsula). —: Nast, 1972: 247 (Korean peninsula). —: Lee et Kwon, 1979: 302, pl. 17-18, figs. 87(a-b), 179-180, app. 837[1]. —: Kim et Nam, 1984: 311[2]. —: Lee et al., 1985: 368[3]. —: Kim et Chang, 1987: 99[4]. —: Park et al., 1988: 166[5].

Evacanthus okumai (sic): Lee et Kwon, 1977: 82 (Korea).

Evacanthus (*Paracanthus*) *ogumae*: Anufriev, 1978: 64 (Korean peninsula). —: Kwon, 1983: 17 (Korea). —: Anufriev et Emel'yanov, 1988: 93-94 (Korean peninsula). —: Kwon et Huh, 1994: 85 (Korea).

Evacanthus agumae (sic): Kim, 1993, Journ. Cheju. 1(2): 298[6].

Locality. GB: Ch'ŏngoksan, P'algongsan, Sudosan; GN: Chirisan; GW: Kyebangsan, Odaesa, Sangbaechae, Sŏraksan[2], Taeamsan[5], T'aebaeksan (=Mt. T'aebaek[4]); HB: Ung'gi (=Nungi: South Hamgyong[1]); JB: Taedunsan, Tŏgyusan; JJ: Chejudo[6], Hallasan (=Mt. Halla[3]); JN: Chogyesan.

Distribution. Korea (North, Central, South, Chejudo), C.I.S. (Maritime Territory, Sakhalin).

Host plant. Unknown.

Genus 2. *Onukia* Matsumura, 1912 오누키관매미충속

Onukia Matsumura, 1912: 44.

Type-species. *Onukia onukii* Matsumura, 1912 (Japan).

Apphia Distant, 1918: 4.

Type-species. *Apphia burmanica* Distant, 1918 (Burma).

4. *Onukia onukii* Matsumura, 1912 오누키관매미충 (Fig. 2)

Onukia onukii Matsumura, 1912: 44-45 (Japan). —: Matsumura, 1915: 157, 183 (Korea). —: Esaki et al., 1938: 76, pl. 33, fig. 132(1) (Korea). —: Esaki, 1950: 287, fig. 763 (Korea). —: Ishihara, 1953: 17, pl. 13(1) (Korea). —: Esaki et Ito, 1954: 60 (Korea). —: Ishihara, 1963: 1-3 (Korea). —: Metcalf, 1963a: 50 (Korea). —: Ishihara, 1965a: 124, pl. 62(12) (Korea). —: Zool. Soc. Kor., 1968: 30 (Korea). —: Vilbaste, 1968: 121 (Korean peninsula). —: Chu, 1969: 42 (North Korea). —: Lee, 1971: 13[1-3]. —: Nast, 1972: 245 (Korean peninsula). —: Anufriev, 1978: 63 (Korean peninsula). —: Lee et Kwon, 1979: 295, pl. 16-17, figs. 83(a-b), 169-171, app. 832-833[4-8]. —: Kwon, 1983: 17 (Korea). —: Kim et Nam, 1984b: 311[9]. —: Kim *et al.*, 1985: 98[10]. —: Lee *et al.*, 1985: 369[11]. —: Kor. Soc. Plant Prot., 1986: 154 (Korea). —: Anufriev et Emel'yanov, 1988: 90 (Korean peninsula). —: Morimoto, 1989: 99 (Korean peninsula). —:

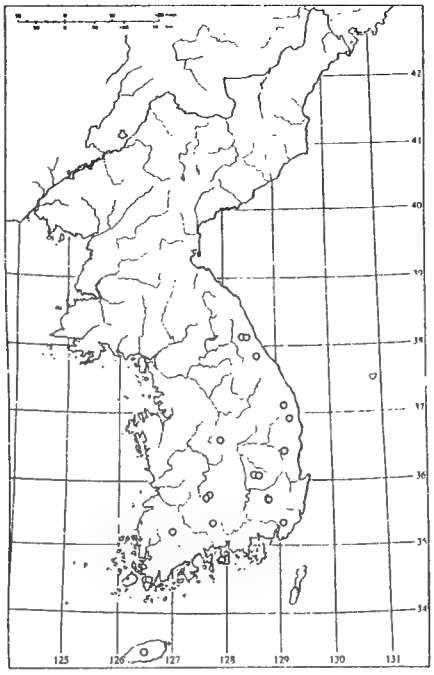

Fig. 2. Distributioin map of *Onukia onukii* (○ locality based on the specimen examined, ○: locality reported previously, ♧: Chinese new record)

Kim, 1993: 299[12]. ——: Kwon et Huh, 1994: 85. (Korea).

Locality. CB: Songnisan; GB: Ch'ŏngoksan, Chuwangsan (=Mt. Chuwang[10]), P'algongsan (=Mt. Palgong[6]), Tansan, T'onggosan, Unmunsan[1] (=Mt. Unmun[5]); GN: Chirisan, Kŏmjŏngsan, Namhaedo; GW: Odaesan, Sŏraksan (=Mt. Sŏrak[9], Mt. Seolak[4]); JB: Tŏgyusan (=Mt. Teogyu[7]); JJ: Chejudo[12] (=Cheju Is.[3]), Hallasan (=Mt. Halla[11], Kwaneomsa[2], Kwaneumsa[8]); JN: Mudŭngsan; Turyunsan; China: 2 ind., Jian, Jilin, 5, VII, 1993.

Distribution. Korea (North, Central, South, Chejudo), China (Jilin: new record), Japan (Hokkaido, Honshu, Kyushu, Shikoku), C.I.S. (Maritime Territory).

Host plant. Miscanthus sinensis (Ch'ŏngoksan, 7, VIII, 1991; Namhaedo, 15, VIII, 1991; T'onggosan, 13, VIII, 1992; cf. Kor. Soc. Plant. Prot, 1972; Kwon, 1983), *Miscanthus* spp. (cf. Kor. Soc. Plant. Prot, 1972; Kwon, 1983).

2) Tribe Errhomenini Fieber, 1871 민숭머리매미충족

Key to genera of Errhomenini

1. Ocelli prominent. Fore wings macropterous in male, brachypterous in female. Aedeagus with processes at apex (subtribe Bathysmatophorina) ····· 2
− Ocelli vestigial or absent. Both sexes with fore wings brachypterous. Aedeagus without processes at apex (subtribe Malmaemichungiina) ····· 3
2. Male pygofer precesses with apices bifurcated ····· *Diodontophorus* gen. nov.
− Male pygofer precesses with apices not branched ····· *Bathysmatophorus*
3. Head narrower than pronotum. Male pygofer with inner processes, caudal margin not bifurcated.

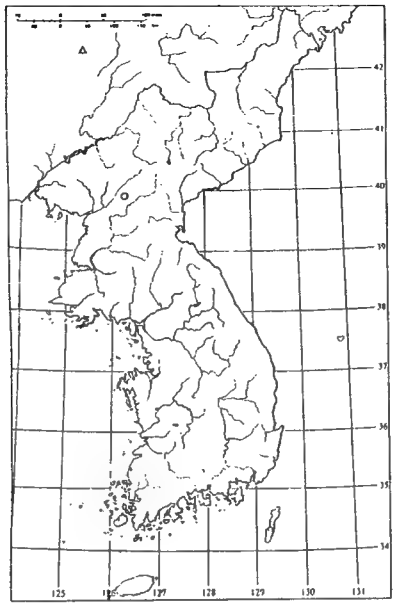

Fig. 3. Distributioin map of *Bathysmatophorus schabliovskii* (○ locality based on the specimen examined, △: Chinese new record).

Male subgenital plates with apices not pointed ····· *Malmaemichungia*

– Head wider than pronotum. Male pygofer without inner processes, caudal margin bifurcated. Male subgenital plates with apices pointed ····· 4

4. Ocelli vestigial. Male pygofer with caudal margins strongly bifurcated, caudoventral margins without any process. Styles simple, without any processes. Male subgenital plates with apices slightly pointed ····· *Koreotettix* gen. nov.

– Ocelli absent. Male pygofer with caudal margins slightly bifurcated, caudoventral margins with small spine-like projections. Styles with apical and subapical processes. Male subgenital plates with apices sharply and distinctly pointed ····· *Bannalgaechungia*

Subtribe Bathysmatophorina Fieber, 1871 민숭머리매미충아족

Genus 3. *Bathysmatophorus Sahlberg*, 1871 민숭머리말매미충속

Bathysmatophorus Sahlberg, 1871: 109.

Type-species. *Bathysmatophorus reuteri* J. Sahlberg, 1871 (Lapland).

5. *Bathysmatophorus schabliovskii* Kusnezov, 1932 고산말매미충 (Fig. 3)

Bathysmatophorus schabliovskii Kusnezov, 1932: 166 (U.S.S.R.- Maritime Territory). ——: Kwon et Huh, 1994: 85 (Korea).

Bathysmatophorus schabliovskii (partim): Lee et Kwon, 1979: 303, figs. 181-182, app. 837-838 (Korea). ——: Kor. Soc. Plant. Prot., 1986: 153 (Korea).

Locality. Myohyangsan [♀, Myohyangsan, 31, V, 1984 (SNHM): 1♂, Myohyangsan, 3, VI, 1984 (SNHM)].

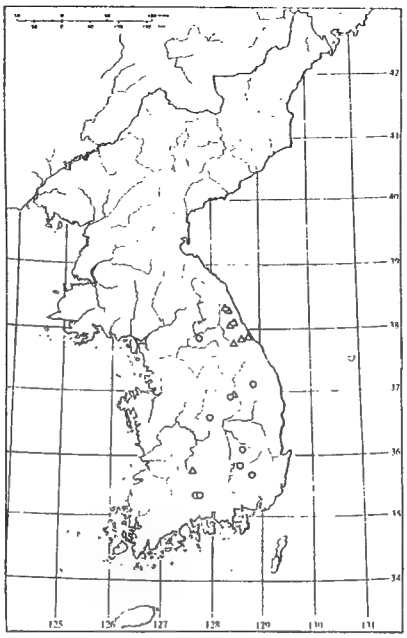

Fig. 4. Distributioin map of *Diodontophorus* (black: locality based on the specimen examined, blank: locality reported previously; ○: *D. japonicus*, △: *D. koreanus*)

Distribution. Korea (North), China (Jilin: new record), Japan (Hokkaido), C.I.S. (Siberia).

Remarks. All the domestic records of the present species previously reported from Korea should refer to *Diodontophorus koreanus*, due to the identification error. So, this is the real first record of the present species in Korean peninsula. It has been also found in Northeast China just border to Korea during this investigation, for the first time [China: 1♂ & 3♀♀, Kaolintze, Jilin, 10-13, VII, 1939 (ASBC)].

Genus 4. *Diodontophorus* gen. nov. 산말매미충속 (신칭) (Fig. 4)

Type-species. *Bathysmatophorus koreanus* Kwon, 1983 (Korea).

Head very short, less than 1/3 as long as wide including eyes, about 2/3 as long as pronotum mesally, slightly narrower than pronotum in male and nearly same in female; crown flatten, with anterior margin roundly elevated between eyes and slightly carinate; posterior margin nearly straight; eyes bulging dorsad; ocelli prominent, located near anterior margin; frontoclypeus strikingly inflated; anteclypeus inflated laterally. Pronotum with lateral margins nearly parallel in female, slightly diverged posteriorly in male. Scutellum large, slightly longer than pronotum mesally and 0.7 times as wide as pronotum, flattened in female and inclined basally in male. Fore wing macropterous in male, but brachypterous, thick and hardened in female. Hind wing also brachypterous in female and macropterous in male. Male pygofer with process arising from inner dorsal margin, bidentate apically. Style directed dorsally in lateral view. Aedeagus with apical process vestigial.

Gender. Masculine.

Remarks. The present new genus is closely similar to *Bathysmatophorus* in external feature. But, it is easily separable from the allied genus by the shape of inner pygofer process which is bifurcated apically, while that of *Bathysmatophorus* is single and gradually narrowed. Currently, the following

2 East Palaearctic species have been known to this new genus.

Key to species of *Diodontophorus*

1. Male pygofer with caudal margin rounded. Aedeagus with apical portion long and narrow, strikingly curved dorsad ..... *japonicus*
– Male pygofer with caudal margin triangularly pointed. Aedeagus with apical portion atrophied ..... *koreanus*

6. *Diodontophorus japonicus* (Ishihara, 1957) comb. nov. 지리산말매미충

Bathysmatophorus japonicus Ishihara, 1957: 338-339. ——: Lee et Kwon, 1977: 81-82[1]. ——: Lee et Kwon, 1979: 304, app. 838[2]. ——: Kwon, 1983: 20-21. ——: Kor. Soc. Plant Prot., 1986: 153 (Korea). ——: Kwon et Huh, 1994: 85 (Korea).

Locality. CB: Songnisan; GB: Chuhŭlsan, P'algongsan, Sobaeksan, Taegu, Unmunsan; GN: Chirisan[1] (=Mt. Chiri[2]); GW: Obongsan, T'aebaeksan.

Distribution. Korea (Central, South), Japan (Honshu).

Host plant. Quercus mongolica (Taegu, 31, V, 1983; Obongsan, 12, V, 1985; Unmunsan, 19, V, 1985; P'algongsan, 18, V, 1991; cf. Kwon, 1983).

7. *Diodontophorus koreanus* (Kwon, 1983) comb. nov. 우리산말매미충

Bathysmatophorus koreanus Kwon, 1983: 21[1].

Bathysmatophorus linnavuorii (nec Ishihara): Kim et Kim, 1971: 151[2-3]. ——: Kim et Kim, 1972a: 70[4-5]. ——: Kim *et al.*, 1975: 210[6].

Bathysmatophorus shabliovskii (partim nec Kusnezov). ——: Lee et Kwon, 1977: 82[7]. ——: Lee et Kwon, 1979: 303, figs. 181-182, app. 837-838[8-10].

Bathysmatophorus koreanus+*Bathysmatophorus shabliovskii* (partim nec Kusnezov): Kor. Soc. Plant Prot., 1986: 153.

Bathysmatophorus koreanus: Kwon et Huh, 1994: 85 (Korea). ——: Kwon et Huh, 1994: 85 (Korea).

Locality. GB; Sobaeksan[7] (=Mt. Sobaek[9]); GW: Hyangnobong[6], (=Mt. Hyangnobong[10]), Kyebangsan, Odaesan[3] (=Mt. Odae[8]), Sogŭmgang (=Sogumgang[2]), Sŏraksan (=Mt. Seolagsan[1]); JB: Tŏgyusan (=Gucheondong[4], Mujugun[5]).

Distribution. Korea (Central).

Host plant. Quercus mongolica (Sŏraksan, 30, VI, 1984; Kyebangsan, 31, V, 1991; cf. Kwon, 1983).

Remarks. All the domestic records of the present species previously reported, should refer to *Bathysmatophorus schabliovskii* Kusnezov, 1932, due to the identification error.

Subtribe Malmaemichungiina Kwon, 1983 장님말매미충아족

Genus 5. *Bannalgaechungia* Kwon, 1983 반날개말매미충속 (Fig. 5)

Bannalgaechungia Kwon, 1983: 20, 22-23.

Type-species. *Bannalgaechungia alticola* Kwon, 1983 (Korea).

Key to species of *Bannalgaechungia*

1. Male pygofer with caudodorsal margins slightly curved downwards apically in lateral view. Styles with apices strongly bent inwards and well developed ..... *alticola*

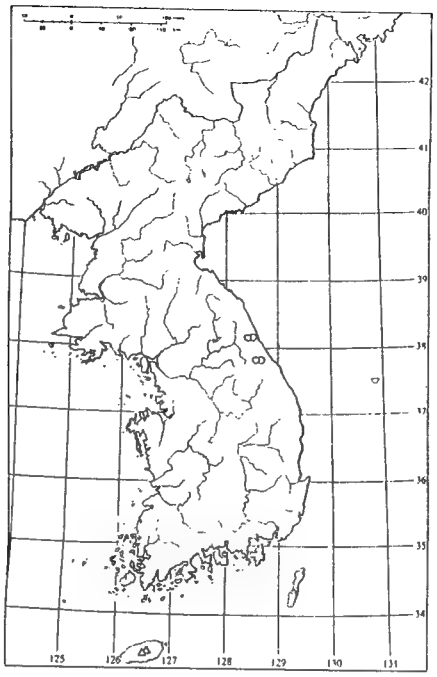

Fig. 5. Distributioin map of *Bannalgaechungia* (black: locality based on the specimen examined, blank: locality reported previously; ○: *B. alticola*, △: *B. hanlasana*).

– Male pygofer with caudodorsal margins simply narrowed. Styles with apices slightly curved inwards, very small ····· *hanlasana*

8. *Bannalgaechungia alticola* Kwon, 1983 반날개말매미충

Bannalgaechungia alticola Kwon, 1983: 23-24, fig. 4[1] (Korea). ——: Oman *et al.*, 1990: 194[1]. ——: Kwon et Huh, 1994: 85 (Korea).

Locality. GW: Odaesan, Sŏraksan (=Mt. Seolagsan[1]).

Distribution. Korea (Central).

Host plant. *Stephanandra incisa* (Sŏraksan, 19, VIII, 1989).

Remarks. According to Kwon (1983), this species inhabits 'bushes and herbs of rock area in high altitude around the peak Daecheongbong of Mt. Seolagsan, 1650-1708m, where the major vegetation is composed of *Pinus pumila*, *Rhododendron* spp., and *Betula* spp.'

9. *Bannalgaechungia hanlasana* Kwon, 1983 한라산반날개말매미충

Bannalgaechungia hanlasana Kwon, 1983: 24, fig. 5[1] (Korea). ——: Kwon et Huh, 1994: 85 (Korea).

Locality. JJ: Hallasan (=Mt. Halasan[1]).

Distribution. Korea (Chejudo).

Host plant. 'Bushes of rocky area in high altitude' (*cf.* Kwon, 1983).

Genus 6. *Koreotettix* gen. nov. 고려말매미충속 (신칭)

Type-species. *Koreotettix parvus* gen. et sp. nov. (Korea).

Head short, nearly 3/5 - 4/5 as long as pronotum mesally, 2.8 - 3.3 times as wide as long including

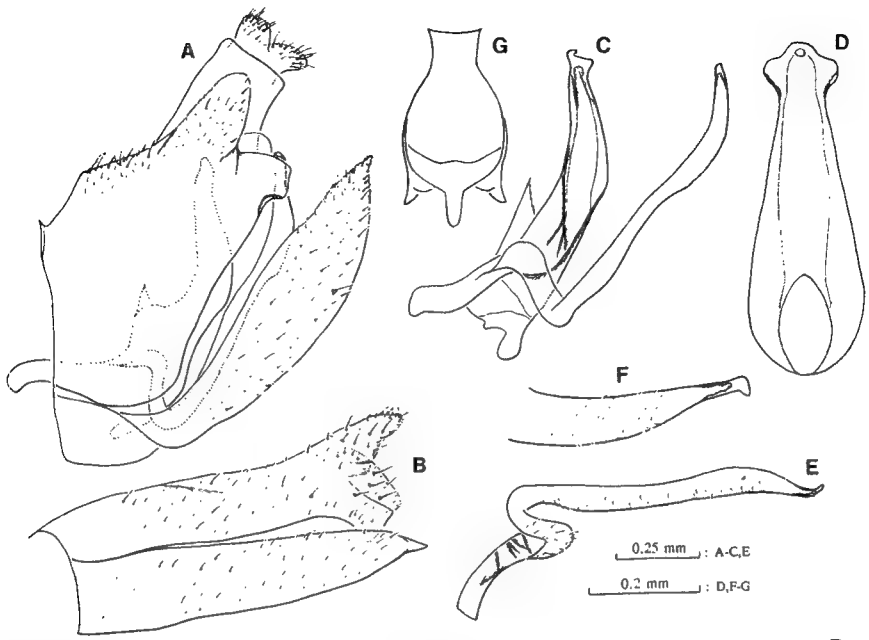

Fig. 6. Male genitalia of *Koreotettix parvus* gen. et sp. nov. A: pygofer in lateral view; B: ditto, ventral view; C: aedeagus and style in lateral view; D: aedeagus in caudal view; E: style in dorsal view; F: tip of style in caudoventrolateral shape; G: connective in dorsal view.

eyes, apparently wider than pronotum; crown flatten and slightly concave, with anterior margin rather extended and slightly carinate; posterior margin elevated, subparallel with anterior margin; eyes slightly bulging dorsad; ocelli vestigial and may only visible under high powered magnification, located below each anterior arm of Y-shaped median carina which obscurely traceable on disc; frontoclypeus rather flat on median inflation, with a shallow hollow near the top, upper margin nearly straight; anteclypeus subparallel. Pronotum with lateral margins subparallel, more or less divergent; lateroposterior angles obtuse, not produced. Scutellum small, about 0.6 times as long as pronotum mesally, 1.3 times as wide as long, inclined basally, without crescent suture. Fore wing brachypterous in both sexes, thick and hardened. Hind wing vestigial. Hind tibia bearing with usually 10 - 11 macrosetae on upper-outer row.

Male pygofer with caudal margin produced and strikingly bifurcated. Subgenital plate narrowed distally and pointed at tip. Style with apical process prominent. Aedeagus extended laterally at apical portion.

Gender. Masculine.

Remarks. This new genus ia allied to *Bannalgaechungia*, but differs in the male genitalia lacking the subapical process of style, and having strongly bifurcated pygofer at caudal margin *etc*.

10. *Koreotettix parvus* gen. et sp. nov. 꼬마고려말매미충 (신칭) (Fig. 6, 7)

General coloration with dark brown to black markings, somewhat polished. Pronotum with two hollows and dark brown to black patches on anterolateral margin, transeversely striated near anterior and posterior margin. Fore wing with claval suture obscurely present, pale yellow to yellowish brown at basal one third.

Male genitalia with pygofer strongly bifurcated at caudal margin; upper one roundly pointed upwa-

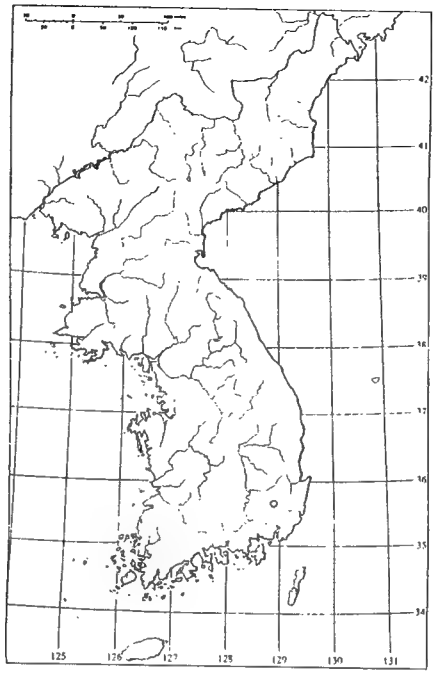

Fig. 7. Distribution map of *Koreotettix parvus* gen. et sp. nov.

rds; lower one somewhat shorter than upper one, rectangularly truncate and directed slightly downwards in lateral view; inner lateral margin without process. Subgenital plate slightly exceeding pygofer lame. Style slightly shorter than lower caudal lame of pygofer; apical process bent downward in lateral view; subapical part without process, continuously rounded, widest and abruptly narrowed apically; process and half part slightly constricted. Aedeagus symmetrical, widest and rounded at base in caudal view, narrowed distally, broad at anteapical portion, almost same length with style; gonopore terminal. Connective rather robust, tapered mesally at distal margin, roundly swollen at posterolateral side and narrowed apically, with apical portion angularly truncate.

Female 7th sternum with caudal margin rather deeply concaved mesally (>1/4).

Overall length. Male 6.0 - 7.0 mm, female 8.0 mm.

Type-material. Holotype ♂, Unmunsan, GB, Korea, 21, V, 1991, on *Stephanandra incisa,* Y. J. Kwon; paratypes: 5♂♂, 1♀, same data as holotype.

Locality. GB: Unmunsan.

Distribution. Korea (South).

Host plant. *Stephanandra incisa.*

Remarks. This new species is closely related to the other *Malmaemichungia* species, but can be well distinguished by the shape of male genitalia having pygofer lame which is strikingly bifurcated at caudal margin. Besides, the inner lateral process and subapical process of style are lacking.

Thus, this new species should be apparently derived from the common ancestor with those of *Malmaemichungia* and *Bannalgaechungia* represented in Korean peninsula, generally because of the structural similarity in morphology and the same ecological niche occupied.

Genus 7. *Malmaemichungia* Kwon, 1983 장님말매미충속

Malmaemichungia Kwon, 1983, Korean J. Ent. 13(1): 21-22.

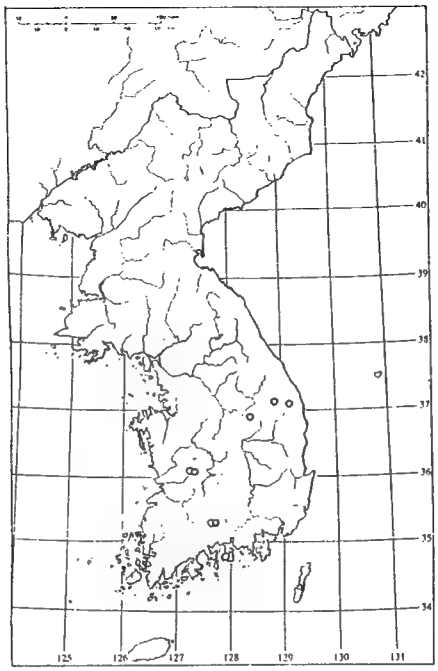

Fig. 8. Distribution map of *Malmaemichungia brachycephala* (O: locality based on the specimen examined, O: locality reported previously).

Type-species. *Malmaemichungia brachycephala* Kwon, 1983 (Korea).

11. *Malmaemichungia brachycephala* Kwon, 1983 장님말매미충 (Fig. 8)

Malmaemichungia brachycephala Kwon, 1983: 22, fig. 3[1-2] (Korea). ——: Oman et al., 1990: 227[1]. ——: Kwon et Huh, 1994: 85 (Korea).

Locality. GB: Ch'ŏngoksan, Sobaeksan; GN: Chirisan (=Mt. Jirisan[2]), K msan; GW: T'aebaeksan; JB: Taedunsan (=Mt. Daedunsan[1]).

Distribution. Korea (Central).

Host plant. Stephanandra incisa (Ch'ŏngoksan, 27, VI, 1993; Sobaeksan, 10, V, 1985; Chirisan, 25, VII, 1985; Kŭmsan, 11, VI, 1989; T'aebaeksan, 18, VI, 1983).

3) Tribe Pagaroniini Anufriev, 1978

Key to genera of Pagaroniini

1. Yellowish green to light green in living state, usually stramineous in dried specimens. Head subconically pointed at apex ····· 2
− Dark brown to black markings or black to brown markings, shining. Head roundly pointed at apex, not subconical ····· *Kurotsuyanus*
2. Head with 2 spots. Aedeagus usually with a pair of processes near middle, with a pair of processes basally ····· *Epiacanthus*
− Head with 3 spots, or entirely absent. Aedeagus usually with 2 pairs of terminal processes, without basal processes ····· *Pagaronia*

Genus 8. *Epiacanthus* Matsumura, 1902 쌍점말매미충속

Epiacanthus Matsumura, 2: 353.

Type-species. *Deltocephalus stramineus* Motschulsky, 1861 (Japan).

12. *Epiacanthus stramineus* (Motschulsky, 1861) 쌍점말매미충

Deltocephalus stramineus Motschulsky: 24 (Japan).

Epiacanthus stramineus: Nakayama et Okamoto, 1940: 225 (Korea). ——: Nakayama, 1943: 184-186 (Korea). ——: Esaki et Ito, 1954: 24 (Korea). ——: Lee, 1963: 240 (Korea). ——: Metcalf, 1965: 400-401 (Korea). ——: Ishihara, 1966: 35 (Korea). ——: Vilbaste, 1968: 120 (Korean peninsula). ——: Ko, 1969: 18 (Korea). ——: Chu, 1969: 40 (North Korea). ——: Nast, 1972: 249 (Korean peninsula). ——: Kor. Soc. Plant Prot., 1972: 124 (Korea). ——: Anufriev, 1976: 49-50 (Korean peninsula). ——: Lee et Kwon, 1977: 81 (Korea). ——: Anufriev, 1978: 66 (Korean peninsula). ——: Lee et Kwon, 1979: 312, figs. 198-199, app. 839-840 (Korea). ——: Kwon, 1983: 18 (Korea). ——: Kor. Soc. Plant Prot., 1986: 153 (Korea). ——: Anufriev et Emel'yanov, 1988: 95 (Korean peninsula). ——: Morimoto, 1989: 99 (Korean peninsula). ——: Kwon et Huh, 1994: 85 (Korea).

Locality. Unknown.

Distribution. Korea (North), Japan (Hokkaido, Honshu, Shikoku), C.I.S. (Kuril, Maritime Territory, Sakhalin, E. Siberia).

Host plant. Previous records on the host plants in Korea should need reconfirmation, as neither the domestic reports on the collected localities nor specimens of this species have been available hitherto.

Genus 9. *Kurotsuyanus* Ishihara, 1953 멋쟁이매미충속

Kurotsuyanus Ishihara, 1953: 4, 18, pl. 16(1).

Type-species. *Tettigoniella sachalinensis* Oshanin, 1912 (Sahkalin).

13. *Kurotsuyanus sachalinensis* (Oshanin, 1912) 멋쟁이매미충 (Fig. 9)

Tettigonia fusca Matsumura, 1911: 23 (nom. praeocc., Japan).

Tettigoniella sachalinensis Oshanin, 1912: 100 (Sakhalin).

Kurotsuyanus sachalinensis: Kwon, 1983: 17[1-4]. ——: Kwon et Huh, 1994: 85 (Korea).

Locality. GN: Chirisan (=Mt. Jirisan[4]), Kŭmjŏngsan (=Mt. Geumjeongsan[1]), Namhaedo[2]; JB: Taedunsan (=Mt. Daedunsan[3]).

Distribution. Korea (South), Japan (Honshu, Kyushu), C.I.S. (Sakhalin).

Host. *Carex* spp. (*cf.* Kwon, 1983).

Remarks. This species has a remarkable color variation in dark markings on external feature, ranging from light brown to pitch black.

Genus 10. *Pagaronia* Ball, 1902 황백매미충속

Pagaronia Ball, 1902: 19.

Type-species. *Pagaronia tredecimpunctata* Ball, 1902 (U.S.A.).

Matuta Emel'yanov, 1966: 99

Type-species. *Tettigonia guttigera* Uhler, 1896 (Japan).

Kalkandelenia Kocak, 1981: 32.

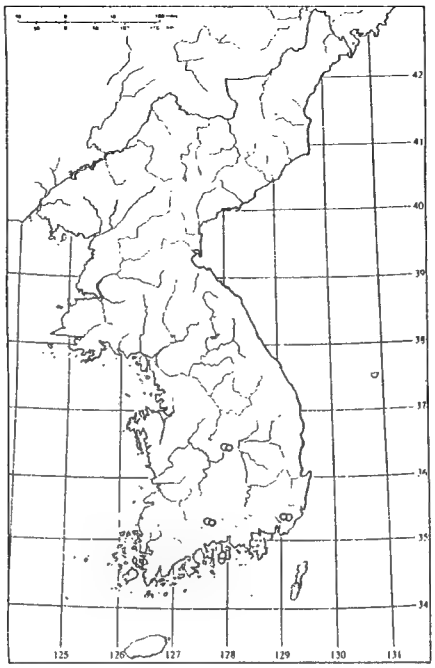

Fig. 9. Distribution map of *Kurotsuyanus sachalinensis* (●: locality based on the specimen examined, ○: locality reported previously).

Type-species. *Tettigonia guttigera* Uhler, 1896 (Japan).

Key to species of *Pagaronia*

1. Male pygofer lames without prominent processes on inner surfaces. Female 7th abdominal sternum with median incision hardly or slightly concave at caudal margin (subgenus *Pagaronia*) 2
– Male pygofer lames with prominent processes on inner surfaces. Female 7th abdominal sternum with median incision broadly and deeply concave at caudal margin (subgenus *Parapagaronia*) 14
2. Vertex without 3 black spots on anterior margin ..... *whangaksana*
– Vertex with 3 black spots on anterior margin 3
3. Male pygofer lames with caudoventral margins apparently produced and irregularly serrate ... 4
– Male pygofer lames with caudoventral margins not produced, even and smoothly rounded 6
4. Terminal processes of aedeagus with apical processes serrate on upper side ..... *taeamsana* sp. nov.
– Terminal processes of aedeagus with apical processes not serrate 5
5. Apical processes of aedeagus longer than 4 times as long as length of anteapical processes ..... *umbratica* sp. nov.
– Apical processes of aedeagus about 3 times as long as length of anteapical processes ..... *seolagsana*
6. Anteapical processes of aedeagus nearly as long as length of apical processes ..... *jungsukae*

– Anteapical processes of aedeagus shorter than apical processes ····· 7
7. Anteapical processes of aedeagus directed upwards ····· *chejuensis* sp. nov.
– Anteapical processes of aedeagus directed downwards ····· 8
8. Anteapical processes of aedeagus located near base ····· 9
– Anteapical processes of aedeagus not located near base ····· 10
9. Anteapical processes of aedeagus projecting inwards of apical processes in caudal view ····· *geojedoensis*
– Anteapical processes of aedeagus projecting outwards of apical processes in caudal view ····· *heuksanensis*
10. Anteapical processes of aedeagus projecting inwards of apical processes in caudal view ··· 11
– Anteapical processes of aedeagus projecting outwards of apical processes in caudal view ··· 12
11. Apical processes of aedeagus nearly as long as length of stem. Anteapical processes 1/3 as long as length of apical processes ····· *continentalis*
– Apical processes of aedeagus about 2 times as long as length of stem. Anteapical processes half as long as length of apical processes ····· *silvatica*
12. Terminal processes of aedeagus slender near tips. anteapical processes half as long as length of apical processes, projecting outwards directly ····· *naejangsana* sp. nov.
– Terminal processes of aedeagus robust near tips. anteapical processes 1/3 as long as length of apical processes, bent inwards ····· *similis* sp. nov.
13. Dorsum with dark brown markings ····· *maculipennis* sp. nov.
– Dorsum without any markings ····· 14
14. Vertex with 3 black spots anteriorly ····· 15
– Vertex without any black spots anteriorly ····· 22
15. Male pygofer processes extended apically and serrate irregularly ····· *koreana*
– Male pygofer processes narrowed and spine-like ····· 16
16. Male pygofer processes with apices bifurcated ····· 17
– Male pygofer processes with apices not branched ····· *hamata*
17. Male pygofer processes with basal spines ····· *evansi*
– Male pygofer processes without basal spines ····· 18
18. Both upper and lower spines of male pygofer processes nearly same length ··· *bifurcata* sp. nov.
– Both upper and lower spines of male pygofer processes not same length ····· 19
19. Upper spines of male pygofer processes much shorter than lower ones ····· *jirisana*
– Upper spines of male pygofer processes longer than lower ones ····· 20
20. Male pygofer shorter than subgenital plates ····· *seungmoi*
– Male pygofer much longer than subgenital plates ····· 21
21. Male pygofer lames roundly expanding distally ····· *elegans* sp. nov.
– Male pygofer lames gradually tapering distally ····· *diversa* sp. nov.
22. Male pygofer processes arising from ventral margin in lateral view ····· *hallasana*
– Male pygofer processes arising from next to ventral margin in lateral view ··· *pallida* sp. nov.

Subgenus *Pagaronia* Ball, 1902 황백매미충아속 (Fig. 10)

Pagaronia Ball, 1902: 19.
Type-species. *Pagaronia tredecimpunctata* Ball, 1902 (U.S.A.).

14. ***Pagaronia (Pagaronia) chejuensis* sp. nov. 제주황백매미충 (신칭)** (Fig. 11)

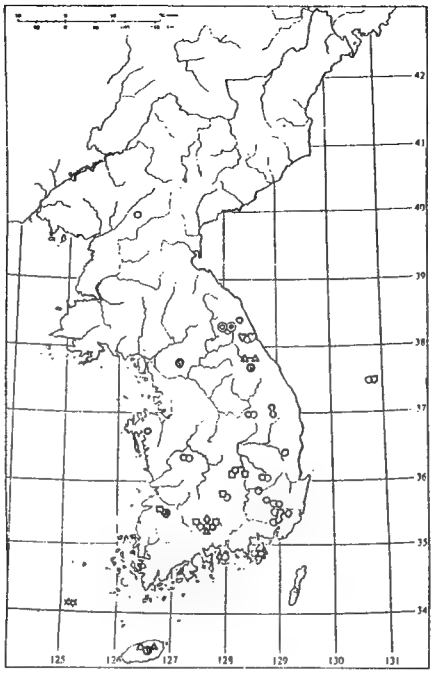

Fig. 10. Distribution map of subgenus *Pagaronia* (black: locality based on the specimen examined, blank: locality reported previously; ⓐ: *P. chejuensis*, ○: *P. continentalis*, △: *P. geojedoensis*, ☆: *P. heuksanensis*, ♤: *P. jungsukae*, ⓑ: *P. naejangsana*, ▽: *P. seolagsana*, ◇: *P. silvatica*, ⓓ: *P. similis*, ◎: *P. taeamsana*, ⓔ: *P. umbratica*, □: *P. whangaksana*).

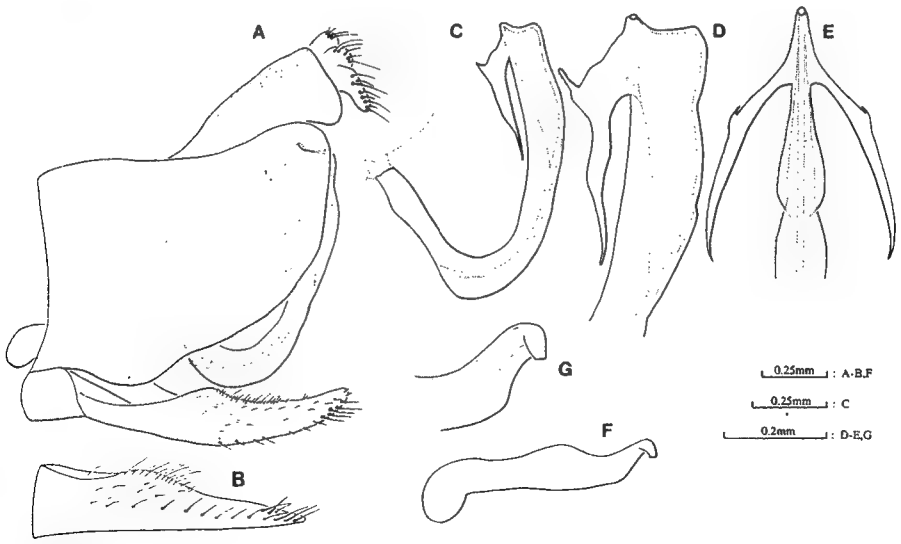

Fig. 11. Male genitalia of *Pagaronia* (*Pagaronia*) *chejuensis* sp. nov. A: pygofer in lateral view; B: subgenital plate in ventral view; C: aedeagus in lateral view; D: ditto, tip: E: ditto, caudal view; F: style in lateral view; G: ditto, tip.

General coloration pale yellow to dirty brownish yellow or orange yellow in dried specimen, pale green in living one. Vertex dirty brownish yellow, with 3 black spots near frontal margin, subtriangula-

rly produced foreward, with median length less than half as long as distance between eyes. Frontoclypeus brownish yellow, with a black spot next to apex. Fore wing pale yellow or whitish yellow to orange yellow, subhyaline, and sometimes with slightly visible brownish shading on inner margin. Hind wing milky-white, vein orange yellow, subhyline. Hind tibia with 14-15 upper-outer macrosetae.

Male genitalia with pygofer rather quadrate, slightly curved upwards at dorsocaudal angle in lateral view, truncate at caudal margin in lateral view, and slightly excavated on lateral margin; inner surface without any process. Subgenital plate slightly shorter than pygofer lame, about 3 times as long as basal width. Aedeagus strongly curved basad, apex armed with a pair of bifurcated terminal process; apical process less than half times as long as shaft, broad in the basal half and gradually narrowed, aculeate in the apical one third; anteapical process with a small spine at basal one third directed upward in lateral view; shaft with gonoduct situated along with posterior margin of distal half in lateral view; gonopore terminal; dorsal apodeme very long, exceeding 2/3 of shaft. Connective with median longitudinal keel, which is well developed and disc like as in other allied species. Style short, about 2/3 of pygofer lame, and half of subgenital plate.

Female 7th sternum with caudal margin slightly concaved mesally (<1/5).

Overall length. Male 8.9-9.3 mm; female 9.9-10.2 mm.

Type-material. Holotype ♂, San'gumburi, JJ, Korea, 29, V, 1990, Y. J. Kwon; paratypes: 19♂♂, 19♀♀, same data as holotype.

Locality. JJ: San'gumburi.

Distribution. Korea (Chejudo).

Host plant. Unknown.

Remarks. This new species is closely allied to *P. innoshimensis* Okada, 1978 by the characteristic male genitalia, however, it can be distinguished in details of aedeagus. The apical process of the former is shorter, and the dorsal apodeme is longer, about two thirds of shaft which is less than half in the latter.

15. *Pagaronia* (*Pagaronia*) *continentalis* Anufriev, 1970 황백매미충

Pagaronia continentalis Anufriev, 1970: 555-556[1-4] (Korea). ——: Nast, 1972: 249 (Korean peninsula). ——: Anufriev, 1978: 66 (Korean peninsula). ——: Lee et Kwon, 1981: 149[19]. ——: Kim et Nam, 1984b: 311[26]. ——: Kim et Chang, 1987: 99[27]. ——: Anufriev et Emel'yanov, 1988: 95 (Korean peninsula).

Epiacanthus guttiger (sic, nec Uhler): Lee, 1971: 13[5].

Pagaronia (s. str.) *continentalis*: Kwon et Lee, 1978: 8, fig. 1[6-12]. ——: Lee et Kwon, 1979: 306, pl. 18, figs. 90(a-b), 187-190, app. 838[1-4,13-18]. ——: Kwon, 1981: 3, fig. 2[20-25]. ——: Kwon, 1983: 19 (Korea).

Pagaronia (s. str.) *continentalis* (partim): Park et al, 1988a: 166[28].

Pagaronia (*Pagaronia*) *continentalis*: Kwon et Huh, 1994: 85 (Korea).

Locality. CN: Kyeryongsan (=Mt. Gyeryongsan[24]), Tŏksungsan; GB: Ch'ŏngoksan, Chuwangsan, Hwangaksan (=Mt. Whangaksan[25]), Kasan[7], P'algongsan[23] (=Mt. Palgong[17], Palgong Mts.[8]), Sobaeksan[10] (=Mt. Sobaek[15]), Taegu (=Kyungpook Univ. Campus[5]), Ullŭngdo (=Ulreung Is.[19]), Unmunsan; GN: Chirisan[9] (=Mt. Chiri[18]), Kajisan[22], Kayasan (=Haeinsa Temple[6], Haein Temple[16]), Kŭmjŏngsan (=Mt. Geumjeongsan[20]), Taeunsan, Wŏnhyosan (=Mt. Weonhyosan[21]); GW: Kŏnbongsan, Odaesan[11] (=Mt. Odae[13]), Sŏraksan (=Mt. Seolak[14], Mt. Seolaksan[12], Mt. Sŏrak[26]), T'aebaeksan (=Mt. T'aebaek[27]), Taeamsan[28]; PB: Hyangamni (=Hjangam-ri: distr. Hjangsan[1]), Hyangsanch'on (=d. Hjangsan v. f. Hjangsan-chon[3]), Manp'oktong (=d. Hjangsan: vall. Manphok-tong[2]), Mansudong (=d. Hjangsan; vall. mansu-tong[4]); China: 1♂, Wuchang, Heilongjiang, 8, VII, 1970; 1♂, Kaolintze, Jilin, 10, VII,

1940.

Distribution. Korea (North, Central, South, Ullŭngdo), China (Heilongjiang: new record, Jilin: new record), C.I.S. (Maritime Territory).

Host plant. *Clematis apiiflora* (Ch'ŏngoksan, 27, VI, 1993; Chuwangsan, 8, VI, 1991; P'algongsan, 6, VI, 1978; Unmunsan, 21, V, 1991; Kŭmjŏngsan, 26, V, 1989).

Remarks. The records of this species from 'Byunsan Peninsula' and 'Naebyunsan' by Hwang *et al.* (1991) need confirmation through the identification of the voucher specimens.

16. *Pagaronia (Pagaronia) geojedoensis* Kwon et Lee, 1980 거제도황백매미충

Pagaronia geojedoensis Kwon et Lee, 1980b: 1-2, figs. 1, 3(2)[1] (Korea). ——: Nast, 1982, : 320 (Korean peninsula).

Pagaronia kumsanensis (partim) Choe, 1980: 149, figs. 1-7[2] (Korea).

Pagaronia (s. str.) *geojedoensis*: Kwon, 1983: 19 (Korea).

Pagaronia (s. str.) *continentalis* (nec Anufriev): Kim, 1984: 202[3].

Epiacanthus guttigera (nec Uhler)+*Pagaronia continentalis* (nec Anufriev): Lee *et al.*, 1985: 368-369[4-5].

Epiacanthus guttiger (sic, nec Uhler)+*Epiacanthus* sp.+*Pagaronia continentalis* (nec Anufriev): Kim, 1993: 297, 299[6].

Pagaronia (Pagaronia) geojedoensis: Kwon et Huh, 1994: 85 (Korea).

♂ *Locality.* GN: Chirisan, Kŏjedo (=Geojedo Is.[1] Geoje Island[2]); GW: Odaesan; JJ: Chejudo[6] (= Cheju island[3]), Hallasan (=Yŏngsil[4]), Sujangwŏn[5].

Distribution. Korea (Central, South, Chejudo).

Host plant. Latifoliates in shady forest (*cf.* Kwon, 1983).

17. *Pagaronia (Pagaronia) heuksanensis* Choe, 1980 흑산황백매미충

Pagaronia heuksanensis Choe, 1980: 149-152, figs. 8-14[1] (Korea).

Pagaronia (Parapagaronia) heuksanensis: Kwon, 1983: 19 (Korea).

Pagaronia (Pagaronia) heuksanensis: Kwon et Huh, 1994: 85 (Korea).

Locality. JN: Sohŭksando (=Soheuksan Island[1]).

Distribution. Korea (South).

Host plant. Unknown.

Remarks. In the original description, the illustrations of figs. 8-14 were a topographical error for this species, and figs. 15-21 should refer to *P. hamata.*

18. *Pagaronia (Pagaronia) jungsukae* Kwon et Lee, 1980 정숙황백매미충

Pagaronia jungsukae Kwon et Lee, 1980a: 44-45, fig. 1[1] (Korea). ——: Nast, 1982: 320 (Korean peninsula).

Pagaronia kumsanensis (partim) Choe, 1980: 149, figs. 1-7[2] (Korea).

Pagaronia (s. str.) *jungsukae:* Kwon, 1981: 3 (Korea). ——: Kwon, 1983: 19 (Korea).

Pagaronia (Pagaronia) jungsukae: Kwon et Huh, 1994: 85 (Korea).

Locality. GN: Namhaedo (=Yongmunsa Temple1, Mt. Kum[2]).

Distribution. Korea (South).

Host plant. Latifoliates in shady forest (*cf.* Kwon, 1983).

Remarks. In the original description, the illustration of fig. 1 was a topographical error for this species, and fig. 2 should refer to *P. whangaksana.*

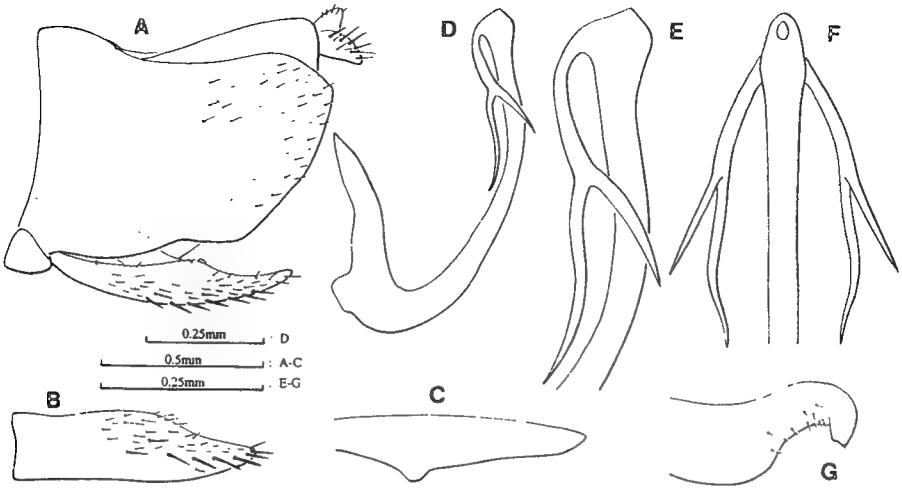

Fig. 12. Male genitalia of *Pagaronia* (*Pagaronia*) *naejangsana* sp. nov. A: pygofer in lateral view; B: subgenital plate in ventral view; C: pygofer lame; D: aedeagus in lateral view; E: ditto, tip: F: ditto, caudal view; G: tip of style in lateral view.

19. *Pagaronia* (*Pagaronia*) *naejangsana* sp. nov. 내장산황백매미충 (신칭) (Fig. 12)

General coloration pale green to yellowish green in living state, pale yellowish orange to dirty yellow in dried specimens. Head with three black spots on crown, and a much larger black patch on next to top of frontoclypeus; median length shorter than distance between eyes.

Male genitalia with pygofer 1.2 - 1.3 times longer than wide, without inner process, simple obliquely rounded caudad; ventral margin slightly sinuate. Subgenital plate 0.8 - 0.9 times shorter than pygofer lame, with outer margin of distal one-third narrowed to apex. Aedeagus slender, symmetrical; shaft bent at base and roundly curved distally, with apex armed with a pair of bifurcated terminal process; apical process slender and meandering, about twice as long as anteapical process, 1.3 times as long as stem; anteapical process short, about same as long as stem; gonopore small and terminal. Style typically long, with apex bent downward.

Female 7th sternum with caudal margin slightly emarginate medially.

Overall length. Male 7.3-7.8 mm, female 8.6-9.2 mm.

Type-material. Holotype ♂, Naejangsan, JB, Korea, 12, VI, 1990, Y. J. Kwon; paratypes: 6♂♂ and 9♀♀, same data as holotype.

Locality. JB: Naejangsan.

Distribution. Korea (South).

Host plant. Unknown.

Remarks. The present new species apparently belongs to the *continentalis*-species group. However, it may be apparently separable from the allied species by the meandering shape of the apical processes in male aedeagus.

20. *Pagaronia* (*Pagaronia*) *seolagsana* Kwon, 1983 설악산황백매미충

Pagaronia (s. str.) *seolagsana* Kwon, 1983, Korean J. Ent. 13(1): 19, fig. 1[1] (Korea).

Pagaronia (*Pagaronia*) *seolagsana:* Kwon, 1994: 85 (Korea).

Locality. GW: Sŏraksan (=Mt. Seolagsan[1]).

Distribution. Korea (Central).

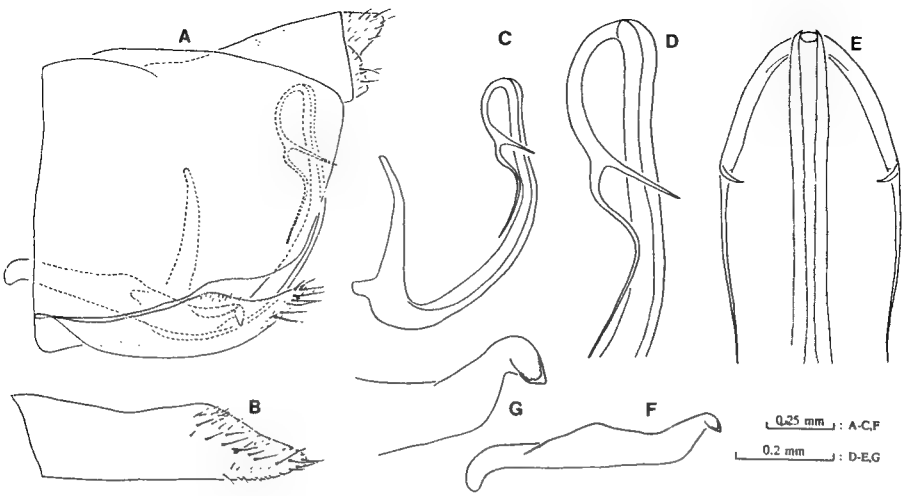

Fig. 13. Male genitalia of *Pagaronia* (*Pagaronia*) *similis* sp. nov. (for caption, see Fig. 12).

Host plant. Reported as 'latifoliate bushes and herbs around the summit (alt. 1600- 1708m)' (*cf.* Kwon, 1983).

21. *Pagaronia* (*Pagaronia*) *silvatica* Kwon, 1981 수풀황백매미충

Pagaronia (s. str.) *silvatica* Kwon, 1981: 2-3, fig. 1[1-2] (Korea). ——: Kwon, 1983: 19 (Korea).

Locality. GN: Chirisan (=Mt. Jirisan[1]); JB: Taedunsan (=Mt. Daedunsan[2]).

Distribution. Korea (South).

Host plant. Latifoliates in shady forest (*cf.* Kwon, 1983).

22. *Pagaronia* (*Pagaronia*) *similis* sp. nov. 닮은황백매미충 (신칭) (Fig. 13)

General coloration pale yellow in dried specimen, pale green in living one. Vertex pale yellow to pale yellowish green with 3 small black spots anteriorly, and a round black spot on top of frontoclypeus, wider than head including eyes. Pronotum and scutellum pale yellow to pale yellowish orange. Fore wing whitish yellow, subhyaline, tinged with slightly visible dark shading on inner margin. Hind wing pale whitish, subhyaline, vein membranous. Hind tibia with 12 - 13 upper-outer macrosetae.

Male genitalia with pygofer quadrate, and truncate at caudal margin in lateral view; inner surface without any process, slightly excavated on ventral margin. Subgenital plate slightly shorter than pygofer lame, about 3.5 times as long as basal width, nearly parallel-sided and gradually narrowed to distal 2/5 to apex. Aedeagus slender, symmetrical, shaft bent at base and roundly curved distally, apex armed with a pair of bifurcated terminal processes; apical process long and slender, exceeding half of shaft, about 1.5 times as long as common stem, roundly curved caudad at base and recurved cephalad in the rest, with sharply pointed apex; anteapical process short, about 1/3 times as long as apical process and a half times as long as common stem, produced at outer margin of apical process and bent to inward in caudal aspect; gonopore terminal. Connective with median longitudinal keel, which is well developed and disc like. Style shorter than subgenital plate and terminated at distal 1/2, apex bent downward with a small tooth like process in lateral view.

Female 7th sternum with caudal margin slightly concave mesally (<1/4).

Overall length. Male 8.9 - 9.5 mm, female 10.0 - 10.3 mm.

Type-material. Holotype ♂, Puk'ansan, GG, Korea, 2, VI, 1989, Y. J. Kwon; paratypes: 3♂♂

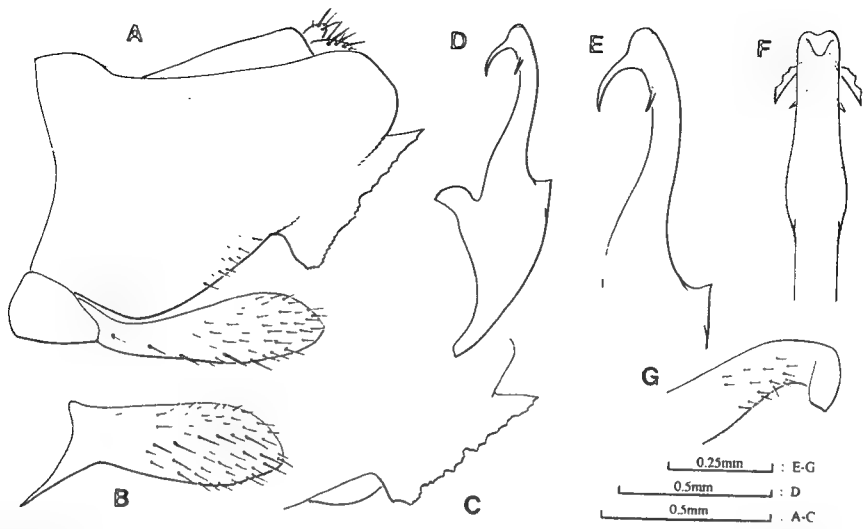

Fig. 14. Male genitalia of *Pagaronia* (*Pagaronia*) *taeamsana* sp. nov. A: pygofer in lateral view; B: subgenital plate in ventral view; C: pygofer lame in ventrolateral view; D: aedeagus in lateral view; E: ditto, tip: F: ditto, caudal view; G: tip of style in lateral view.

& 2♀♀, same data as holotype.

Locality. GG: Puk'ansan.

Distribution. Korea (Central).

Host plant. Unknown.

Remarks. This new species is similar and allied to *P. silvatica, P. naejangsana* sp. nov., and especially to *P. continentalis.* But, it differs from them by the shape of terminal process of the aedeagus. In the former, the apical process is curved caudad at base and recurved cephalad in the rest, the anteapical process is produced at outer margin of apical process in caudal view.

23. *Pagaronia* (*Pagaronia*) *taeamsana* sp. nov. 대암산황백매미충 (신칭) (Fig. 14)

Pagaronia (s. str.) *continentalis* (partim nec Anufriev): Park et Choi, 1988: 166[1].

General coloration pale yellowish orange to dirty yellow in dried specimens, pale green to yellowish green in living one. Vertex with three black spots anteriorly, and a much larger black spot on next to top of frontoclypeus; median length shorter than distance between eyes.

Male genitalia with pygofer about 1.3 times longer than wide, without inner processes; caudoventral margin strikingly produced and irregularly serrate. Subgenital plate short, not reaching distal 1/5 of pygofer, somewhat constricted basally and obliquely rounded to apex. Aedeagus broad basally, symmetrical; shaft abruptly narrowed near middle and recurved distally in lateral shape, with a triangular lobe-like process on the ventral side; apex armed with a pair of sharp curved apical processes, dorsolateral sides irregularly serrate; anteapical process small and straightly produced, shorter than half of apical process; gonopore small, terminal. Style typically long, with apex obliquely bent downward.

Female 7th sternum with caudal margin slightly emarginate medially.

Overall length. Male 7.3-7.8 mm; female 7.9-8.5 mm.

Type-material. Holotype ♂, Taeamsan, GW, Korea, 12, VII, 1990, Y. J. Kwon; paratypes: 8♂♂ and 9♀♀, same data as holotype.

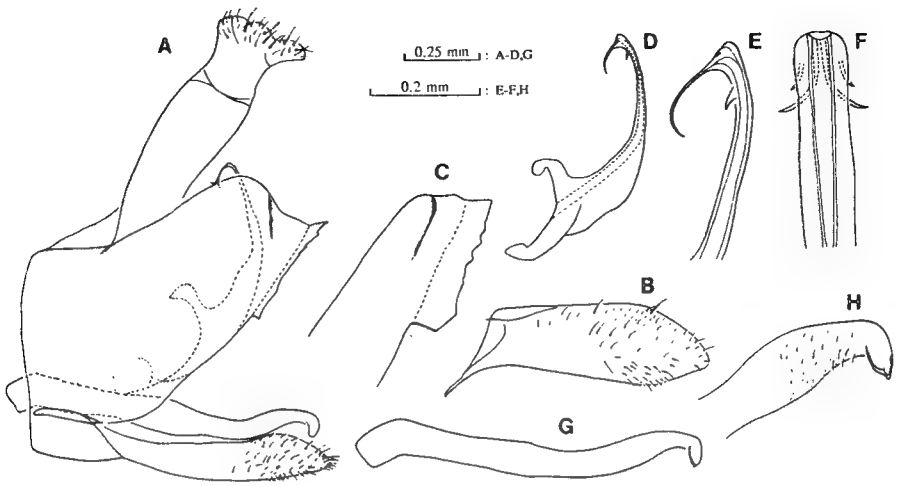

Fig. 15. Male genitalia of *Pagaronia (Pagaronia) umbratica* sp. nov. A: pygofer in lateral view; B: subgenital plate in ventral view; C: pygofer lame in ventrolateral view; D: aedeagus in lateral view; E: ditto, tip: F: ditto, caudal view; G: style in lateral view; H: ditto, tip.

Locality. GW: Taeamsan[1].

Distribution. Korea (Central).

Host plant. Unknown.

Remarks. This new species is the second member of the *seolagsana*-species group, having a characteristic lobe on the caudoventral margin of male pygofer lame. It can be easily separated from *P. seolagsana* Kwon, 1983, by having a triangular process on the ventral side of male aedeagus.

24. *Pagaronia (Pagaronia) umbratica* sp. nov. 그늘황백매미충 (신칭) (Fig. 15)

General coloration pale yellow to dirty yellow in dried specimen, pale green in living one. Vertex with 3 black spots anteriorly, median length about half as long as distance between eyes, almost as long as pronotum mesally. Frontoclypeus with a much larger black spot near frontal apex. Pronotum wider than head including eyes. Fore wing subhyaline, with slightly visible brownish shading on inner margin. Hind wing whitish, subhyaline. Hind tibia with 12-13 upper-outer macrosetae. Male genitalia with pygofer rather slender, widest at base, nearly twice as long as basal width; inner margin without any process; caudal margin flatten in lateral view, and the caudoventral tip pointed; caudoventral margin produced and irregularly serrate. Subgenital plate nearly as long as pygofer lame and 3 times as long as median width, somewhat constricted basally. Aedeagus broad basally, distal half elongate, and slender, symmetrical, apex with two pairs of terminal processes; apical process slender and elongate, about one sixth as long as the shaft in lateral view, gently curved ventrad; anteapical process shorter, and about 1/4 - 1/5 as long as apical processs in lateral view, directed cephaloventrad; gonopore terminal. Style nearly as long as subgenital plate.

Overall length. Male 7.8 - 8.1 mm.

Type-material. Holotype ♂, Odaesan, GW, Korea, 15, VIII, 1989, Y.J. Kwon; paratypes: 2♂♂, same data as holotype.

Locality. GW: Odaesan.

Distribution. Korea (Central).

Host plant. Unknown.

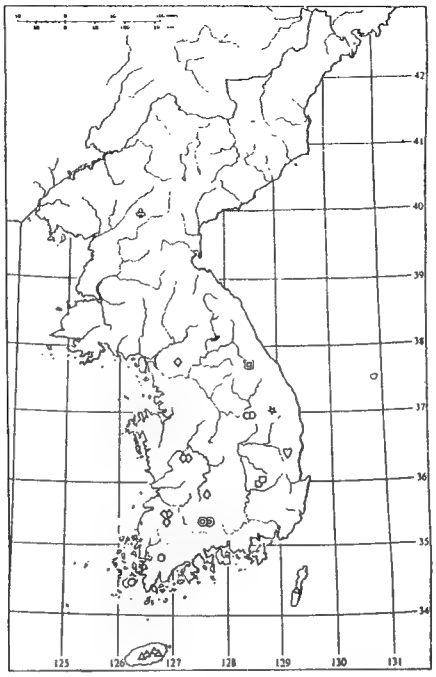

Fig. 16. Distribution map of subgenus *Parapagaronia* (black: locality based on the specimen examined, blank: locality reported previously; ☆: *P. bifurcata*, ♤: *P. diversa*, ♡: *P. elegans*, ○: *P. evansi*, △: *P. hallasana*, ⧈: *P. hamata*, ◎: *P. jirisana*, ♧: *P. koreana*, ⧈: *P. maculipennis*, ㊞: *P. pallida*, □: *P. seungmoi*).

Remarks. This new species is very similar to *P. seolagsana* and *P. taeamsana*, but separated by the morphological differences in aedeagus, of which the shaft is much more slender and elongate, and the apical process is also distinctly longer and slender, but not denticulate.

25. *Pagaronia* (*Pagaronia*) whangaksana Kwon et Lee, 1980 황악산황백매미충

Pagaronia whangaksana Kwon et Lee, 1980a: 43-44, fig. 2[1] (Korea). ——: Nast, 1982: 320 (Korean peninsula).

Pagaronia (s. str.) *whangaksana:* Kwon, 1981, Korean J. Ent. 11(2): 3-4[2].——: Kwon, 1983: 19 (Korea).

Pagaronia (*Pagaronia*) *whangaksana:* Kwon et Huh, 1994: 85 (Korea).

Locality. GB: Hwangaksan (=Mt. Whangaksan[1]), GN: Chirisan (=Mt. Jirisan[2]), JB: Naejangsan, Tŏgyusan.

Distribution. Korea (South).

Host plant. Latifoliates in shady forest (*cf.* Kwon, 1983).

Remarks. In the original description, the illustration of fig. 2 was a topographical error for this species, and fig. 1 should refer to *P. jungsukae.*

Subgenus *Parapagaronia* Kwon et Lee, 1978 가시황백매미충아속 (신칭) (Fig. 16)

Parapagaronia Kwon et Lee, 1978: 8.

Type-species. *Pagaronia jenjouristi* Anufriev, 1970 (Japan).

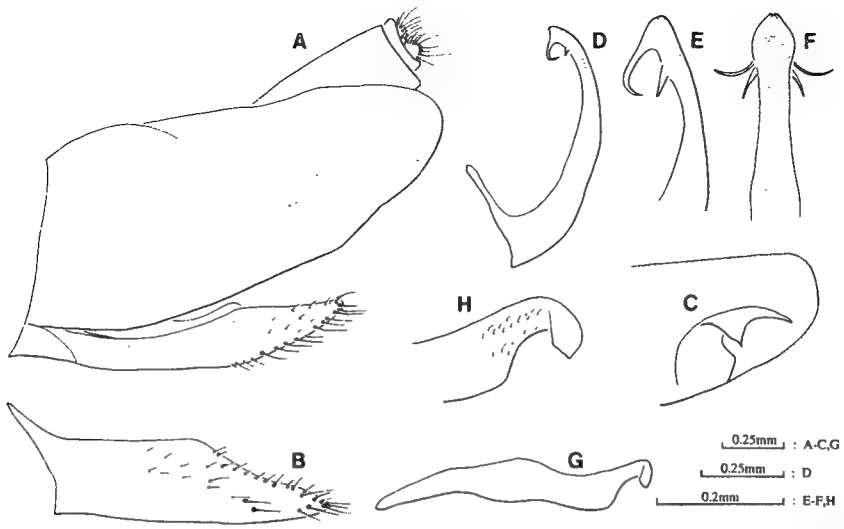

Fig. 17. Male genitalia of *Pagaronia* (*Parapagaronia*) *bifurcata* sp. nov. A: pygofer in lateral view; B: subgenital plate in ventral view; C: innerside of pygofer lame; D: aedeagus in lateral view; E: ditto, tip: F: ditto, caudal view; G: style in lateral view; H: ditto, tip.

26. *Pagaronia* (*Parapagaronia*) *bifurcata* sp. nov. 동쪽황백매미충 (신칭) (Fig. 17)

General coloration pale greenish yellow, or pale yellow in dried specimen, pale green in living one. Vertex pale orange yellow, with 3 black spots near anterior margin, transversely striated along anterior margin and between ocelli to apex vertically, median length about 0.6 times as long as distance between eyes, almost 0.7 times as long as pronotum mesally. Frontoclypeus pale orange yellow, with a black spot near apex. Pronotum and scutellum yellowish green, semitransparent. Fore wing pale whitish yellow and subhyaline, with slightly visible brownish shading on inner and apical margins. Hind wing somewhat milky-white, vein pale green or pale yellow, subhyaline. Hind tibia with 13 - 14 upper-outer macrosetae.

Male genitalia with pygofer slender, elongate caudad, exceeding twice as long as basal width. Pygofer process arising from inner ventrolatral margin, bent caudad at base and strongly twisted ventrad, symmetrically bifurcated like crab claw, and the tip sharply pointed. Subgenital plate slightly shorter than pygofer, about two thirds of pygofer lame, widest at half and narrowed to apex, three times as long as the widest portion. Aedeagus broadest near base, narrowed distally, gently curved upwards, symmetrical, apex with two pairs of terminal processes; apical process slender, sharply pointed to apex, slightly curved upwards in caudal view; anteapical process shorter than apical process, about half length, the tip sharply pointed and directed downwards; gonopore terminal. Style short, about half of pygofer lame and terminated at distal one third of subgenital plate; apex bent downwards.

Overall length. Male 8.9 - 9.0 mm, female 9.2 - 10.5 mm.

Type-material. Holotype ♂, Ch'ŏngoksan, GB, Korea, 12, VI, 1993, Y.J. Kwon; paratypes: 1♂, same data as holotype; 5♂♂, 15♀♀, same locality, 27, VI, 1993, E.Y. Huh.

Locality. GB: Ch'ŏngoksan.

Distribution. Korea (Central).

Host plant. Unknown.

Remarks. This new species is similar to other *Parapagaronia* species and much closely allied to *P. seungmoi* and *P. jirisana*. But, the former is well distinguished from them by the shape of

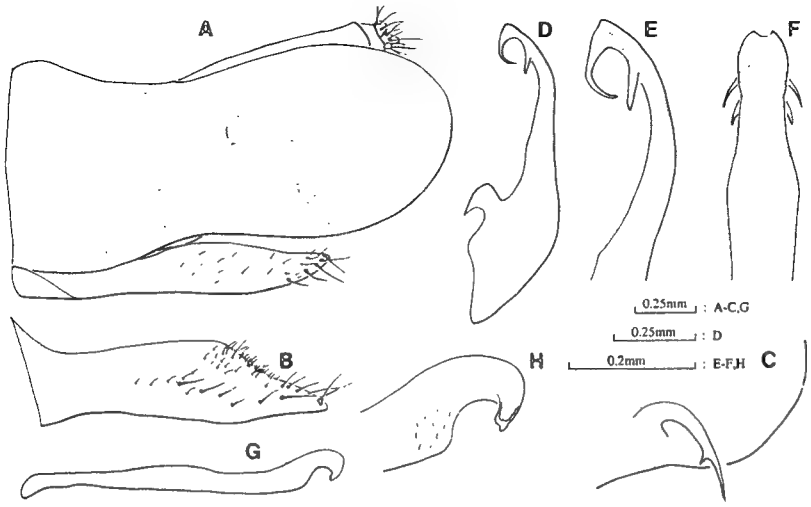

Fig. 18. Male genitalia of *Pagaronia* (*Parapagaronia*) *diversa* sp. nov. (for caption, see Fig. 15).

pygofer process which is thick, larger, and symmetrically bifurcated distally. Besides, apical processes of the aedeagus are shorter, and anteapical processes are longer.

27. *Pagaronia* (*Parapagaronia*) *diversa* sp. nov. 갈래황백매미충 (신칭) (Fig. 18)

General coloration pale orange yellow to dirty brownish yellow in dried specimen, pale green or light yellowish green in living one. Vertex with 3 black spots anteriorly as in other allied species, and another one at apex of frontoclypeus. Fore wing pale yellow or whitish yellow to dirty yellow, subhyaline, and sometimes with slightly visible brownish shading on inner margin. Hind wing whitish, subhyaline. Hind tibia with 14 upper-outer macrosetae.

Male genitalia with pygofer slender, strikingly oblong caudad and slightly constricted at 1/3 in lateral view. Pygofer process arising from inner ventrolateral margin, roundly curved ventrad near base, with a small acute spine ventrally at distal third and about half as long as main spine; main spine long, exceeding the ventral margin of pygofer lame, gently tapered to apex. Subgenital plate distinctly short, about 2/3 as long as pygofer lame. Aedeagus broadest at base, narrowed distally, slightly curved upwards, symmetrical, apex armed with 2 pairs of processes; apical process slender, arched cephalad and the tip acutely and straightly directed ventrad; anteapical process shorter, about half of apical process, slightly curved cephaloventrad; gonopore terminal. Style apparently shorter than subgenital plate, exceeding half of subgenital plate; apex bent downward with a small tooth like process in lateral view.

Female 7th sternum deeply concave mesally (>1/2).

Overall length. Male 8.9 - 9.3 mm; female 8.8 - 10.3 mm.

Type-material. Holotype ♂, Tŏgyusan, JB, Korea, 18, VI, 1991, Y. J. Kwon; paratypes. 3♂♂, 6♀♀, same data as holotype; 1♂, 5♀♀, 20, VI, 1991, same locality & collector.

Locality. JB: Tŏgyusan.

Distribution. Korea (Central).

Host plant. Unknown.

Remarks. The present new species is similar and allied to other *Parapagaronia* species, but well distinguished from them by the shape of male pygofer process which is strikingly divergent apically.

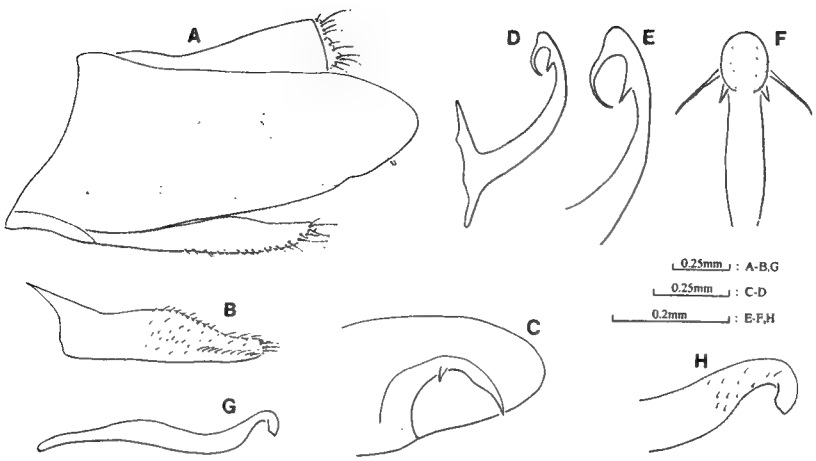

Fig. 19. Male genitalia of *Pagaronia* (*Parapagaronia*) *elegans* sp. nov. (for caption, see Fig. 15).

28. *Pagaronia* (*Parapagaronia*) *elegans* sp. nov. 맵시황백매미충 (신칭) (Fig. 19)

General coloration pale yellow to pale brownish yellow or orange yellow in dried specimen, pale green or light green in living one. Vertex pale yellow, with 3 black spots near anterior margin, subtriangularly produced foreward, with median length about 2/3 times as long as distance between eyes. Frontoclypeus pale yellowish green, with a black spot next to apex. Pronotum pale yellow, somewhat semitransparent on anterior area. Scutellum concolorous with pronotum. Fore wing yellowish white, shiny and subhyaline, tinged with slightly visible dark shading on inner margin. Hind wing whitish and subhyaline. Hind tibia with 12 - 13 upper-outer macrosetae.

Male genitalia with pygofer slender, oblong caudad in lateral view. Pygofer process arising from inner ventral margin, bifurcated, slightly curved and the tip directed caudoventrad, and exceeding the ventral margin of pygofer lame. Subgenital plate slightly shorter than pygofer lame, about 1/4 of pygofer lame in lateral view. Aedeagus tapered and curved dorsad, symmetrical; apex armed with 2 pairs of processes; apical process slender, about 1/4 as long as the shaft, gently arched cephalad and the tip directed caudoventrad; anteapical process shorter, about 1/3 of apical process, protruded cephaloventrad; gonopore terminal. Style shorter than subgenital plate, terminated at distal third of subgenital plate in lateral view.

Female 7th sternum with caudal margin deeply concave mesally (>1/2).

Overall length. Male 8.0 - 8.6 mm; female 9.0 - 9.6 mm.

Type-material. Holotype ♂, Chuwangsan, GB, Korea, 8, VI, 1991, Y.J. Kwon; paratypes. 7♂♂ & 23♀♀, same data as holotype, 1♂, 14, VI, 1991; 2♂♂, 5, VI, 1993; numerous, 11, VI, 1993, all same locality & collector.

Locality. GB: Chuwangsan.

Distribution. Korea (Central).

Host plant. Unknown.

Remarks. This new species is very similar to *P. seungmoi* and *P. jirisana,* but well separated by the male pygofer process which is strikingly divergent, besides the apical spine is directed to caudoventrad and the anteapical spine is directed to ventrad.

29. *Pagaronia* (*Parapagaronia*) *evansi* Kwon et Lee, 1978 에반스황백매미충

Pagaronia (*Parapagaronia*) *evansi* Kwon et Lee, 1978: 9-10, figs. 4, 6[1] (Korea). ——: Lee et Kwon,

1979: 311, pl. 19, figs. 94(a-b), 196-197, app. 839[2]. ——: Nast, 1982: 321 (Korean peninsula). ——: Kwon, 1983: 19 (Korea). ——: Kwon et Huh, 1994: 85 (Korea).

Locality. GB: Sobaeksan[1] (=Mt. Sobaek[2]).

Distribution. Korea (South).

Host plant. Latifoliates in shady forest (*cf.* Kwon, 1983).

Remarks. In the original description, the illustration of fig. 6 was a topographical error for this species, and hence fig. 7 should refer to *P. hallasana.*

30. *Pagaronia (Parapagaronia) hallasana* Kwon et Lee, 1978 한라산황백매미충 (신칭)

Pagaronia (Parapagaronia) hallasana Kwon et Lee, 1978: 8, figs. 2, 7[1] (Korea). ——: Lee et Kwon, 1979: 308, pl. 18, figs. 9(a-b), 191-192, app. 838-839[1]. ——: Nast, 1982: 321 (Korean peninsula). ——: Kwon, 1983: 19 (Korea). ——: Kwon et Huh, 1994: 85 (Korea).

Pagaronia hallasana: Lee *et al.,* 1985, Rep. Acad. Surv. Mt. Halla Nat. Press: 389[2]. ——. Kim, 1993, 299[3].

Locality. JJ: Chejudo[3], Hallasan (=Mt. Halla[2], Seongpanak[1]), San'gumburi.

Distribution. Korea (Chejudo).

Host plant. Latifoliates in shady forest (*cf.* Kwon, 1983).

Remarks. In the original description, the illustration of fig. 7 was a topographical error for this species, and thus fig. 5 should refer to *P. seungmoi.*

31. *Pagaronia (Parapagaronia) hamata* Choe, 1980 갈고리황백매미충

Pagaronia hamatus Choe, 1980: 150-151, figs. 15-21[1-4] (Korea).

Pagaronia (s. str.) *hamatus:* Kwon, 1983: 19 (Korea).

Pagaronia (Parapagaronia) hamata: Kwon et Huh, 1994: 85 (Korea).

Locality. CN: Kyeryongsan (=Mt. Gyeryong[4]); GG: Kwangnŭng (=Gwangneung[3]); JB: Naejangsan (=Mt. Naejang[1]), JN: Paegyangsan (=Mt. Baekam[2]).

Distribution. Korea (Central, South).

Host plant. Latifoliates in shady forest (*cf.* Kwon, 1983).

Remarks. In the original description, the illustrations of figs. 15-21 were a topographical error for this species, while figs. 8-14 given to the present species should refer to *P. heuksanensis.*

32. *Pagaronia (Parapagaronia) jirisana* Kwon, 1981 지리산황백매미충

Pagaronia (Parapagaronia) jirisana Kwon, 1981: 4, fig. 3[1] (Korea). ——: Kwon, 1983: 20 (Korea). ——: Kwon et Huh, 1994: 85 (Korea).

Locality. GN: Chirisan (=Mt. Jirisan[1]).

Distribution. Korea (South).

Host plant. Latifoliates in shady forest (*cf.* Kwon, 1983).

33. *Pagaronia (Parapagaronia) koreana* Anufriev, 1971 고려황백매미충

Pagaronia koreana Anufriev, 1971: 336-337. figs. 4-5[1] (Korea). ——: Nast, 1972: 249 (Korean peninsula).

Pagaronia (Parapagaronia) koreana: Kwon et Lee, 1978: 9 (Korea). ——: Lee et Kwon, 1979: 309, figs. 193, app. 839[2], ——: Kwon, 1983: 19 (Korea). ——: Kwon et Huh, 1994: 86 (Korea).

Locality. PB: Myohyangsan (=Mt. Myohyang[2], Myohyang Mts.[1]).

Distribution. Korea (North).

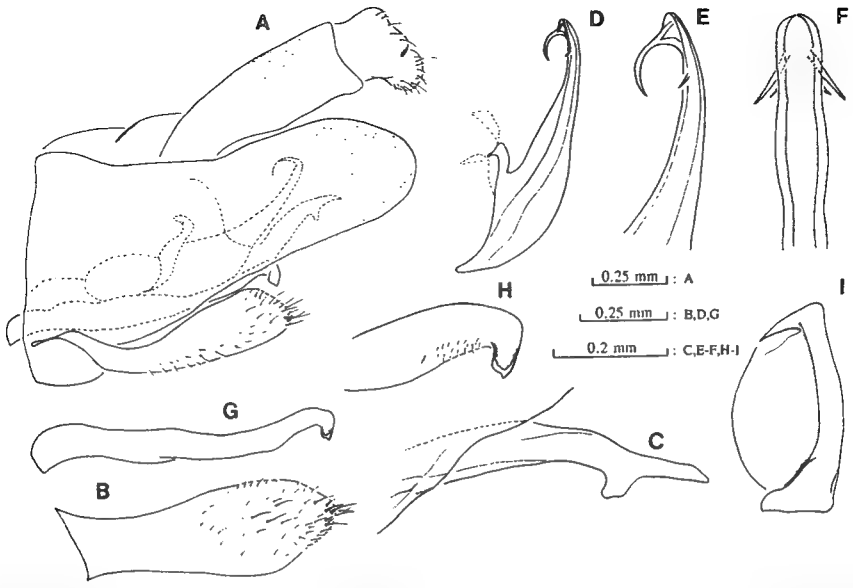

Fig. 20. Male genitalia of *Pagaronia* (*Parapagaronia*) *maculipennis* sp. nov. A: pygofer in lateral view; B: subgenital plate in ventral view; C: innerside of pygofer lame; D: aedeagus in lateral view; E: ditto, tip: F: ditto, caudal view; G: style in lateral view; H: ditto, tip; I: connective in lateral view.

Host plant. Unknown.

Remarks. According to the original description (Anufriev, 1971), the only single male specimen designated as the holotype was known, and the apical part of aedeagus was apparently damaged and missing. So, it needs further material to be collected to understand the exact structure of the male genitalic characters.

34. *Pagaronia* (*Parapagaronia*) *maculipennis* sp. nov. 무늬황백매미충 (신칭) (Fig. 20)

General coloration pale yellowish orange to dirty brownish yellow with distinctly dark brown markings by individuals in dried specimen, pale green in living one with same markings. Markings of pronotum and fore wing varied by individuals. Vertex subtriangularly produced foreward, about 0.7 times as long as distance between eyes, slightly shorter than pronotum, about 0.8 times as long as mesally; anterior margin striated, with 3 black spots. Frontoclypeus with a black spot near apex. Pronotum concolorous with vertex, broadly marked with dark brownish shading except for anterior area, which is slightly semitransparent. Scutellum pale yellow to dirty brownish yellow, without any markings. Fore wing pale yellowish orange, marked with dark brownish shading on clavus and most of apical cells by individuals. Hind wing somewhat milky-white, vein pale yellowish orange, subhyaline. Hind tibia with 12 - 13 upper-outer macrosetae.

Male genitalia with pygofer slender, apparantly oblong caudad, slightly bent upwards at distal half. Pygofer process arising from inner ventrolateral margin, bent dorsad at base, and slightly recurved ventrad near tip with bifurcated spine, rather stout; shaft as wide as style width; the tip of spine tumid and flatten. Subgenital plate distinctly short, about half of pygofer lame, constricted basally and rounded apically in ventral aspect. Aedeagus broadest near base, narrowed distally, gently curved upwards, symmetrical, apex with both a pair of sharply curved apical processes and short anteapical ones; apical process arched and tip directed ventrad; anteapical process much shorter and small, about less than 1/5 of apical process, straightly directed cephalad; gonopore terminal. Style apparently

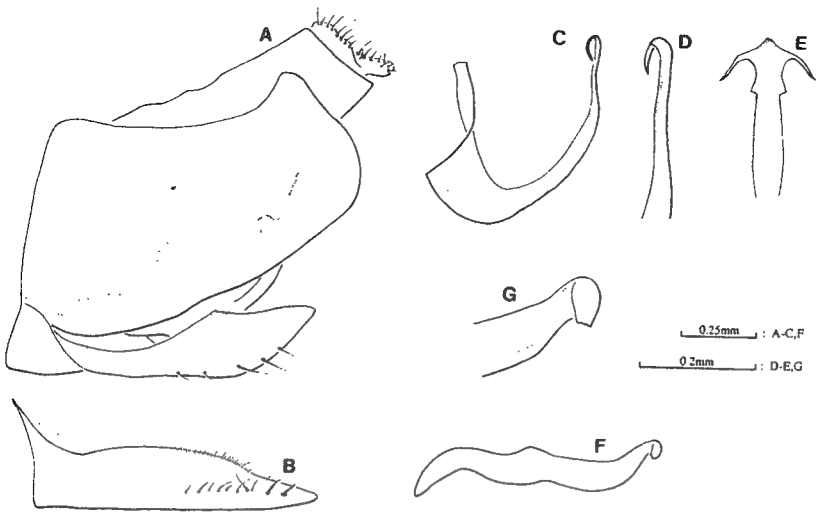

Fig. 21. Male genitalia of *Pagaronia* (*Pagaronia*) *pallida* sp. nov. (for caption, see Fig. 11).

shorter than pygofer lame, exceeding half of pygofer lame, and as long as length of subgenital plate; apex bent downward with a small tooth like process in lateral view.

Female 7th sternum with caudal margin deeply concave mesally (>1/2).

Overall length. Male 8.3 - 9.5 mm; female 9.3 - 9.8 mm.

Type-material. Holotype ♂, Kyebangsan, GW, Korea, 10, VIII, 1991, Y. J. Kwon; paratypes: 4♂♂ & 7♀♀, same data as holotype.

Locality. GW: Kyebangsan.

Distribution. Korea (Central).

Host plant. Unknown.

Remarks. This new speices can be well distinguished externally from allied species by the distinct markings (dark brownish shading) on the hind margin of pronotum and fore wing (claval area, apical cells).

35. *Pagaronia* (*Pagaronia*) *pallida* sp. nov. 호남황백매미충 (신칭) (Fig. 21)

General coloration pale yellow or pale yellowish green in dried specimen, pale green in living one. Vertex lacking black spots, with anterior margin and between ocelli to apex striated vertically, subtriangularly produced forward, about 0.8 times as long as distance between eyes, nearly same length with pronotum mesally, about 0.9 times as long as pronotum. Frontoclypeus pale yellowish green, without any spot. Pronotum concolorous with vertex, semitransparent. Fore wing pale yellowish green or pale greenish white, subhyaline with slightly visible brownish shading on inner margin. Hind wing somewhat milky-white, vein pale green, subhyaline. Hind tibia with 11 - 12 upper- outer macrosetae.

Male genitalia with pygofer slender, slightly oblong caudad in lateral view, about 1.6 times as long as wide, and the tip triangularly swollen; Pygofer process which forming small nipple on inner surface, arising from next to ventral margin. Subgenital plate shorter than pygofer lame, terminated at distal 1/4, widest at distal 2/5, about 4 times as long as width of the portion, with outer margin of distal fourth narrowed to apex in ventral view. Aedeagus slender, symmetrical, broadest at base, slightly constricted at half of shaft, apex armed with two pairs of terminal processes; apical process

sharply pointed to apex, slightly bent ventrad, slender, 1/6 times as long as shaft in caudal view; a pair of anteapical tubercles very small triangular, less than width of the base, about one fifth of the apical process, arising from lateral sides of aedeagal tip; gonopore terminal. Style short, about half of pygofer, and 1/3 of subgenital plate, apex strongly bent cephalad in lateral view.

Female 7th sternum with caudal margin slightly concave mesally (<1/3).

Overall length. Male 8.0 - 8.2 mm; female 9.4 - 9.5 mm.

Type-material. Holotype ♂, Chindo, JN, Korea, 23, V, 1993, on *Clematis apiiflora*, Y. J. Kwon; paratypes: 11♂♂ & 6♀♀, same data as holotype; 5♂♂, Wŏlch'ulsan, JN, Korea, 23, V, 1993, on *Clematis apiiflora*, same collector.

Locality. JN: Chindo, Wŏlch'ulsan.

Distribution. Korea (South).

Host plant. *Clematis apiiflora*, some nymphs were also successfully reared on this host plant until their emergence in laboratory.

Remarks. This new species is similar and allied to *P. whangaksana* and *P. hallasana* by the lacking of black spots on vertex, but is easily separated from *P. hallasana* which has inner pygofer process arising from ventral margin in lateral view. It may be also well distinguished from *P. whangaksana* by the shape of subgenital plate and aedeagus, of which the subgenital plate is shorter than pygofer lame, the anteapical process of aedeagus is distinctly small tubercular and triangular.

36. *Pagaronia (Parapagaronia) seungmoi* Kwon et Lee, 1978 승모황백매미충

Pagaronia (Parapagaronia) seungmoi Kwon et Lee, 1978: 9. figs. 3, 6[1] (Korea). ——: Lee et Kwon, 1979: 310, pl. 19, figs. 93(a-b), 194-195, app. 839[2]. ——: Nast, 1982: 321 (Korean peninsula). ——: Kwon, 1983: 19-20 (Korea). ——: Kwon et Huh, 1994: 86 (Korea).

Locality. GB: P'algongsan (=Kasan[1], Mt. Palgong[2]).

Distribution. Korea (South).

Host plant. Latifoliates in shady forest (*cf.* Kwon, 1983).

Remarks. In the original description, the illustration of fig. 5 was a topographical error for the present species, and hence the fig. 6 given to this species should refer to *P. evansi*. Among the paratype-specimens, those reported from other localities except for P'algongsan area should need to confirm the origin of collecting sites.

4) Tribe Cicadellini Latreille, 1825 말매미충족

Key to Genera of Cicadellini

1. Smaller species less than 10 mm in total length, without black band at apices of fore wings. Head wider than pronotum (subtribe Cicadellina) ····· 2
− Larger species exceeding 12 mm in total length, with black band at apices of fore wings. Head apparently narrower than pronotum (subtribe Bothrogoniina) ····· *Bothrogonia*
2. Vertex apparently shorter than pronotum mesally. Frontoclypeus large and inflated ··· *Cicadella*
− Vertex about as long as pronotum mesally. Frontoclypeus small, flattened ····· *Kolla*

Subtribe Bothrogoniina Kwon, 1983 끝검은말매미충아족

Genus 11. *Bothrogonia* Melichar, 1926 끝검은말매미충속

Bothrogonia Melichar, 1926: 341.

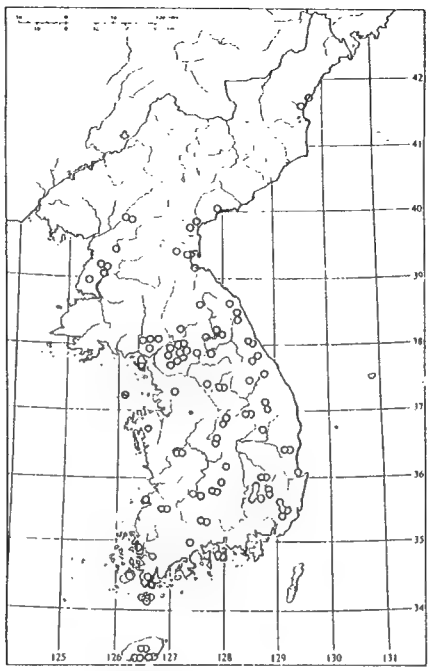

Fig. 22. Distribution map of *Bothrogonia japonica* (●: locality based on the specimen examined, ○: locality reported previously, ♧: Chinese new record).

Type-species. *Cicada ferruginea* Fabricius, 1787 (Cape of Good Hope).

Megalotettigella Ishihara, 1953: 3, 16.

Type-species. *Cicada ferruginea* Fabricius, 1794 (Cape of Good Hope).

37. *Bothrogonia japonica* Ishihara, 1962 끝검은말매미충 (Fig. 22)

Tetigonia ferruginea: Kirkaldy, 1900: 296 (Korea). ——: Kirkaldy, 1901: 49 (Korea).

Tettigonia ferruginea: Oshanin, 1906: 51 (Korea). ——: Doi, 1932: 41[2-6].

Tettigonia ferruginea apicalis (nec Fabricius): Matsumura, 1912: 33-34 (Japan). ——: Okamoto, 1924 a: 58[1].

Tettigoniella ferruginea (nec Fabricius): Oshanin, 1912: 100 (Korea). --: Kuoh, 1966: 60-61, figs. 42-43 (Korea).

Tettigonia ferruginea cinetibepes (nec Fabricius): Educ. Min., 1932: 106 (Korea).

Cicadella ferruginea apicalis (nec Fabricius): Kato, 1932: 222 (Korea). ——: Kamijo, 1933: 56[7-9].

Cicadella ferruginea (nec Fabricius): Wu, 1935: 74 (Korea). ——: Cheo, 1935: 109 (Korea). ——: Masaki, 1936, : 271[10]. ——: Kamijo, 1936: 88[11]. ——: Doi, 1937: 62[12]. ——: Esaki *et al.*, 1938: 80 (Korea). ——: Esaki, 1950: 283, fig. 750 (Korea). ——: Kim, 1960: 24[15]. ——: Kim, 1961: 10[16]. ——: Cho, 1963, Hum. & Sci. Nat. Sci. 6: 171[17]. ——: Educ. Min., 1967: 183[18]. ——: Kim, 1967: 90[19]. ——: Cult. & Inf. Min., 1968: 247[20]. ——: Zool. Soc. Kor., 1968: 29 (Korea). ——: Ku, 1968: 34[21]. ——: Hyun et Woo, 1969: 165 (Korea). ——: Chu, 1969: 39 (North Korea). ——: Seok, 1970: 163[22]. ——: Kor. Soc. Plant Prot., 1972: 124 (Korea). ——: Yoon et Nam, 1980a: 32[124]. ——: Park, 1981: 261[125].

Bothrogonia (*Cicadella*) *ferruginea* (nec Fabricius): Ko, 1969: 17 (Korea).

Amblycephalus ferrugineus (nec Fabricius): Esaki et Ito, 1954: 8-12[13].

Cicadella ferrugines (sic, nec Fabricius): For. Exp. Stat. Kor., 1959: 87[14].
Bathroogonia (sic) *japonica* Ishihara, 1962: 289-291 (Japan).
Cicadella felruginea (sic, nec Fabricius): Lee, 1963: 240 (Korea).
Bothrogonia ferruginea (nec Fabricius)+*Bothrogonia ferruginea* (nec Fabricius) *apicalis*: Metcalf, 1965: 235-244.
Bothrogonia japonica: Kim et Kim, 1971: 150[23-24]. ——: : Lee, 1971: 10-12[25-33]. ——: Kim et Kim, 1972a: 70[34-35]. ——: Kim et Kim:194[36-37]. ——: Kim *et al.*, 1975: 210[64-71]. ——: Kim *et al.*, 1976: 95[72]. ——: Lee et Kwon, 1976: 3[73]. ——: Lee et Kwon, 1977: 82-83[24-25,80,85-91]. ——: Kim et Nam, 1978: 130[93]. ——: Lee, 1979: 153[94-95]. ——: Lee et Kwon, 1979: 314-315, pl. 19, figs. 96(a-c), 200-202, app. 840-842[7,96-123]. ——: Chang et Choe, 1982. 9(2): 519-539[126]. ——: Kim et Chang, 1982: 171[127-130]. ——: Nam et Kim, 1982: 127[132]. ——: Park et Kim, 1982: 33[133]. ——: Kwon, 1983: 16[134]. ——: Kim, 1984: 202[135]. ——: Kim et Nam, 1984b: 311[136]. ——: Kim *et al.*, 1985: 98[121]. ——: Lee *et al.*, 1985: 368[32, 137-141]. ——: Kor. Soc. Plant Prot., 1986: 153 (Korea). ——: Kim et Chang, 1987: 99[143]. ——: Park et Park, 1987: 672[107,144]. ——: Park, 1987: 101[144]. ——: Park *et al.*, 1988b: 188[145]. ——: Hwang *et al.*, 1991: 47[146-147]. ——: For. Adm. For. Res. Inst., 1991: 117-118 (Korea). ——: Kim, 1993: 297[149].
Bothrogonia ferruginea (nec Fabricius): Nast, 1972: 248 (Korean peninsula). ——: Dworakowska, 1973: 419[38-63]. ——: Kim et Nam, 1977: 126[92].
Bothrogonia japonia (sic): Lee *et al.*, 1976, Nat. & Life 6: 55[74-84].
Bothogonia japonica (sic): Kim et Nam, 1982: 266[131]. ——: Park et Cho, 1986: 127[142]. ——: Kim et Lee, 1991: 59[148].

Locality. CB: Choryŏng (=Choryeong Barriers[95]), Songnisan (=Mt. Soknisan[87]), Wŏraksan (=Mt. Wolak[94]); CN: Kyeryongsan[79] (=Mt. Gyeryong[126]), Tŏksungsan; GB: Ch'ilgok, Ch'ŏngoksan, Chuwangsan[73] (=Mt. Chuwang[121]), Hwangaksan, Kach'ang, P'algongsan[9] (=Mt. Palgongsan[26], Pagaesa Temple [27], Donghwasa Temple[30], Palgongsan[85]), Pisŭlsan, Samsan[88], Sobaeksan[80] (=Mt. Sobaek[113]), Sudosan, Taegu[7] (=Kyungpook Univ. Campus[33]), Tosan-myon (=Tosan Myeon[86]), Unmumsan[29]; GG: Ch'ŏnmasan (=Mt. Cheonmasan[84], Mt. Cheonma[116]), Kamaksan[64], Kanghwado (=Kanghwado-Sagiri[10], Kwangnŏng, Sagiri-Kwangwha Is.[100]), Kapyŏng (=Gapyung[82], Gapyeong[114]), Kwangnŏng (=Kwangnung[14], Kwangneung[76], Kwangreung[110]), Myŏngjisan[124] (=Mt. Myungji[21], Mt. Myeongjisan[83], Mt. Myeongji[115]), Obongsan[90], Pagyŏn (=Pakjŏn Prov. Kesŏng-si[50]), P'ap'yŏngsan, Puk'ansan (=Mt. Pukhansan [75], Mt. Pukhan[111]), Puldaesan[6] (=Mt. Puldae[98]), Samsŏngsan[5] (=Mt. Samseong[97]), Seoul[131] (=Kyŏngsong[4]), Soyosan[3] (=Mt. Soyo[99]), Suwŏn[148], Tŭkjŏkto[12] (=Teokjeok Is.[101]), Wangbangsan[81](=Mt. Wangbang[112]); GN: Chirisan[89] (=Mt. Jiri: Sesok[16], Mt. Jiri: Sesŭk[19], Mt. Chiri[120], Mt. Chiri: Piagol valley[132], Mt. Jiri: Cheoneonsa[133]), Hwangsŏksan (=Mt. Hwangsŏk[142]), Kajisan, Kayasan[8] (=Haeinsa Temple[25], Haein Temple[118]), Kŭmsan, Namhaedo (=Namhae island: Hwabangsa[125]), Wŏnhyosan, Yŏngch'wisan (=Tongdosa Temple[31], Tongdo Temple[119]); GW: Ch'iaksan (=Mt. Chi-aksan[72], Mt. Chiaksan[78]), Ch'ŏrwŏn[66] (=Cheolweon[106]), Hwach'ŏn[67] (=Whacheon[109]), Hyangnobong[69], Imgye-myŏn (=Imgye-myeon[93]), Kariwangsan, Kodaesan[65] (=Mt. Kodae[105]), Kŏnbongsan[70] (=Mt. Keonbong[109]), Kŭmgangsan (=Kymgang-san[59]), Odaes[104]), Pangbangsan-myŏn (=Pangbangsanmyon[68], Pangsan Myeon[108]), Sogŭmgang (=Sogumgang[23], Mt. Sokeumgang[103], Sogeumgang[145]), Sŏraksan[71] (=Solakŭmountain[15], Mt. Seolag[18], Mt. Seolaksan[28], Mt. Seolak[102], Mt. Sŏrak[136]), T'aebaeksan (=Mt. T'aebaek[143]), Yangsu[144]; HB: Chŏngjin (=Čhŏngdžin[47]), Chŏngnae (=Čhŏnne[62]), Choyang (=Čojang[46]),Chuŭl (=Džuyr Distr. Kjŏngsŏng[49]), Onp'ori (=Onpho-ri[48]); HN: Hamhŭng (=Hamhyng[45]), Hŭngbongni (=Hynpong-ri Distr. Hamdžu[61]), Mandŏksan (=Mantŏk-san[40]), Munch'ŏn (=Munčhŏn[39]), Wŏnsan (=Vŏnsan[38]), Yŏnbongni (=Jŏnpong-ri Distr. Hongvŏn[56]); JB: Byŏnsanbando (=Byunsan peninsula[146], Naebyunsan [147]), Maisan, Naejangsan[77], Tŏgyusan (=Gucheondong[34], Mujugun[35], Mt. Teokyusan[91]); JJ: Chejudo[149]

(=Quelpart island[1], Quelpart I.[13], Quelpaert island: Cheju-do[17], Is. Quelpart[22], Cheju Is.[122] Is. Jejudo[134], Cheju island[135]), Chungmun, Hallasan[20] (=Kwaneomsa Temple[32], Kwaneum Temple[123], Mt. Halla[137], Sŏngp'anak[138], Yŏngsil[139], Tonnaek'o[140], Tongsuakyo[141]), Sŏgwip'o (=Seoguipo[74]); JN: Chagaedo (=Is. Jagai[130]), Chindo, Chogyesan (=Mt. Jogyesan-Sŏnamsa[92]), Mokp'o[10] (=Mokpo[117]), Pogilto (=Is. Bogil[129]), Soan'gundo (=islands Soan[127]), Taedunsan (=Mt. Daedunsan[36], Haenam-gun[37]), Wandogun (=Wando-kun[128]), Waŏlch'ulsan; PB: Hyangamni (=Hjangam-ri Distr. Hjangsan[52]), Munsudong (=valley Munsu-tong[51]), Myohyangsan (=Mjohjang-san[63]), Taep'un (=Tephun: Kudžang[60]); PN: Chamori (=Džamo-ri Distr. Sunčhŏn[58]), Maram (=Maram Distr. Jongsŏng[57]), P'yŏngyang[2] (=Phjŏngyang[43], Pyeongyang[96]), Sŏkamjŏsuji (=Sŏkam-Čŏsudži Distr. Sunan[44]), Sŏngmunni (=Sŏngmun-ri Distr. Samsŏk[55]), Taech'onni (=Tečhŏn-ri[54]), Taesŏng (=Thesŏng Distr. Kangsŏ[53]), Taesŏngsan (=Tesŏng-san [41]), Yongaksan (=Jongak-san: Phjŏngjang[42]); China: 1 ind., Jian, Jilin, 5, VII, 1993.

Distribution. Korea (North, Central, South, Chejudo), China (Northeast, Liaoning, Jilin: new record), Japan (Honshu, Kyushu, Shikoku).

Host plant. Apple (*cf.* Ko, 1969; Kor. Soc. Plant Prot., 1972), *Aralia cordata* (*cf.* Kor. Soc. Plant Prot., 1972, 1986), barley (*cf.* Kor. Soc. Plant Prot., 1972, 1986), berries (*cf.* Esaki & Ito; Kor. Soc. Plant Prot., 1972), Cercis chinensis (*cf.* For. Adm. For. Res. Inst., 1991), citrus (*cf.* Esaki & Ito, 1954; Ko, 1969), *Firmiana* spp. (*cf.* Esaki & Ito, 1954; Ko, 1969), *Glycine* spp. (*cf.* Kor. Soc. Plant Prot., 1972, 1986), grape-vine (*cf.* Esaki & Ito, 1954; Kor. Soc. Plant Prot., 1972), *Morus* spp. (*cf.* Esaki & Ito; Ko, 1969), oats (*cf.* Kor. Soc. Plant Prot., 1972, 1986), *Olea europaea* (*cf.* Kor. Soc. Plant Prot., 1972, 1986), paulownia (*cf.* Esaki & Ito, 1954; Ko, 1969), pear (*cf.* Esaki & Ito, 1954), persimon (*cf.* Kor. Soc. Plant Prot., 1972, 1986), *Prunus persicae* (*cf.* Ko, 1969; Kor. Soc. Plant Prot., 1972), *Pyrus* spp. (*cf.* Ko, 1969; Kor. Soc. Plant Prot., 1972, 1986), *Petasites japonicus* (*cf.* Kor. Soc. Plant Prot., 1972, 1986), *Quercus* spp. (*cf.* Kor. Soc. Plant Prot., 1972, 1986), red been (*cf.* Kor. Soc. Plant Prot., 1972, 1986), rye (*cf.* Kor. Soc. Plant Prot., 1972, 1986), sugar cane (*cf.* Esaki & Ito, 1954; Kor. Soc. Plant Prot., 1972), *Thea sinensis* (*cf.* Esaki & Ito, 1954; Kor. Soc. Plant Prot., 1972, 1986), wheat (*cf.* Kor. Soc. Plant Prot., 1972, 1986), wistaria (*cf.* Kor. Soc. Plant Prot., 1972, 1986).

Subtribe Cicadellina Latreille, 1817 말매미충아족

Genus 12. *Cicadella Latreille,* 1817 말매미충속

Tetigonia Geoffroy 1762: 429 (Nom. praeocc.).
Type-species. *Cicada viridis* Linnaeus, 1758 (Europe).
Cicada Fabricius (nec Linnaeus), 1775: 682 (Nom. praeocc.).
Type-species. *Cicada viridis* Linnaeus, 1758 (Europe).
Tettigonia Olivier, 1789: 24 (Nom. praeocc.).
Type-species. *Cicada viridis* Linnaeus, 1758 (Europe).
Cicadella Latreille, 1817: 406.
Type-species. *Cicada viridis* Linnaeus, 1758 (Europe).
Amblycephalus Curtis, 1833: 193.
Type-species. *Cicada viridis* Linnaeus, 1758 (Europe).
Tettigoniella Jacobi, 1904: 778.
Type-species. *Cicada viridis* Linnaeus, 1758 (Europe).
Tettigella China et Fennah, 1945: 711.
Type-species. *Cicada viridis* Linnaeus, 1758 (Europe).

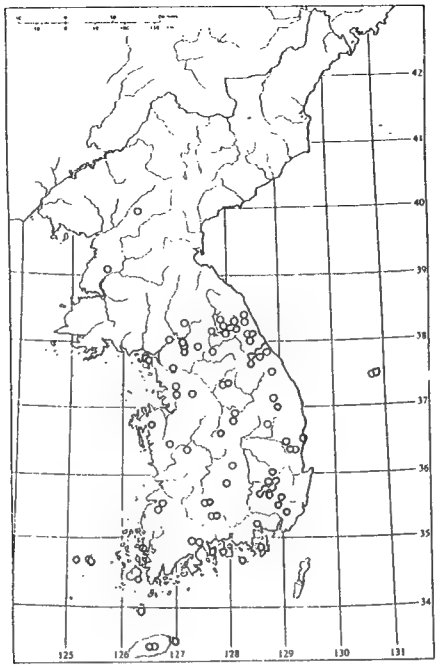

Fig. 23. Distribution map of *Cicadella viridis* (●: locality based on the specimen examined, ○: locality reported previously).

38. *Cicadella viridis* (Linnaeus, 1758) 말매미충 (Fig. 23)

Cicada viridis Linnaeus, 1758: 438 (Europe).

Tettigonia arundinis Germar, 1821: 71-72 (Saxony).

Tettigonia flaricatella Graaf, 1854: 183 (Netherlands).

Tettigoniella viridis concolor Haupt, 1912: 184 (Prussia).

Tettigonia viridis: Okamoto, 1924b: 21, 28, pl. I(7)[1-12]. ——: Muramatsu, 1929: 279 (Korea). ——: Doi, 1932: 41[13-15].

Tettigoniella viridis: Matsumura, 1931: 1261-1262 (Korea). ——: Kamijo, 1933: 56[16-17]. ——: Kamijo, 1936: 88[18]. ——: Kuoh, 1966: 56-57, fig. 36 (Korea).

Cicadella viridis: Masaki, 1936: 271[19]. ——: Esaki *et al.*, 1938: 80, fig. 137 (2) (Korea). ——: Nagaoka, 1938: 27[20]. ——: Esaki, 1950: 283, fig. 752 (Korea). ——: Kim, 1961: 10[21]. ——: Ku, 1966: 26[22]. ——: Ku, 1968: 34[23]. ——: Zool. Soc. Kor., 1968: 29 (Korea). ——: Ko, 1969: 17 (Korea). ——: Chu, 1969: 39 (North Korea). ——: Kor. Soc. Plant Prot., 1972: 124 (Korea). ——: Nast, 1972: 250-251 (Korean peninsula). ——: Young, 1977: 571, fig. 468 (Korea). ——: Lee, 1979: 153[71-72]. ——: Lee et Kwon, 1979: 321-322, pl. 20, figs. 100(a-b), 209-212, app. 844-850[16,22,26,46,48,52,58-64,73-108]. ——: Yoon et Nam, 1980a: 32[111]. ——: Lee et Kwon, 1981: 149[112]. ——: Chang et Choe, 1982: 524[110]. ——: Kwon, 1983: 16 (Korea). ——: Kim, 1984: 202[113]. ——: Kim et Nam, 1984b: 311[114]. ——: Kim et Nam, 1984: 87[115]. ——: Kim *et al.*, 1985: 98[105]. ——: Lee *et al.*, 1985: 368[116]. ——: Kor. Soc. Plant Prot., 1986: 153 (Korea). ——: Ra *et al.*, 1987: 206[117]. ——: Park et Park, 1987: 672[118]. ——: Kim et Chang, 1987: 99[119]. ——: Park *et al.*, 1988a: 166[44]. ——: Kim et Lee, 1991: 59[121]. ——: Kwon et Huh, 1994: 86 (Korea).

Amblycephalus viridis: Esaki et Ito, 1954: 16-21 (Korea).

Cicabella viridis (sic): Lee, 1963: 240 (Korea).

Tettigella viridis: Metcalf, 1965: 147-168 (Korea). ——: Kim et Kim, 1971: 150[24-25]. ——: Lee, 1971: 12-13[26-35]. ——: Kim *et al.*, 1971: 48[36]. ——: Kim et Kim, 1974: 105[37-38]. ——: Kim *et al.*, 1975: 210[39-47]. ——: Lee *et al.*, 1976: 56[48-55]. ——: Lee et Kwon, 1976: 4[56]. ——: Kim *et al.*, 1976: 95[57]. ——: Lee et Kwon, 1977: 83-84[16.28-29.58-68]. ——: Kim et Nam, 1977: 126[69]. ——: Kim et Nam, 1978: 130[70]. ——: Yoon et Nam, 1980b: 136[109-110]. ——: Park, 1987: 101[42]. ——: Park *et al.*, 1988b: 188[120].
Cicadella riridis (sic): Kim et Nam, 1982: 266[52].
Cicadella viridis+*Tettigella viridis:* Kim: 297, 299[122].

Locality. CB: Songnisan; Choryŏng (=Choryeong Barrier[72]), Ch'ungch'ŏngbukto[2], Wŏraksan (=Mt. Wolak[71]); CN: Ch'ilgapsan (=Mt. Chilgab[109]), Ch'ungch'ŏngnamdo[3], Kyeryongsan (=Mt. Gyeryong[110]), Tŏksungsan; GB: Chillyang, Ch'ongoksan, Ch'ŏngsong (=Chungsong[35]), Chuwangsan[56] (=Mt. Chuwang[105]), Hwangaksan (=Chikjisa[17], Chikji Temple[83]), Hwasan (=Whasan[61]), Kachang, Kosan[26], Kyŏngsan-gun (=Kyungsankun[27]), Kyŏngsangbukto[6] (=Kyeongpook Povince[102]), P'algongsan (=Mt. Palgongsan[28], Pagaesa Temple[30], Donghwasa Temple[32], Eonhaesa Temple[34], Mt. Palgong), Panyawŏl (=Panyaweol[58]), Pisŭlsan, Samsan[64], Sobaeksan[66] (=Mt. Sobaek[101]), Taegu[16], Tosan-myŏn (=Tosan Myeon[63]), Ullŭngdo (=Is. Ulreung: Sŏnginbong[36], Uhleung Is.[87], Ulreung Is.[112]), Yŏnghae (=Yeonghae [59]); GG: Imjin-myŏn[39] (=Imjin Myeon[88]), Kanam-myŏn (=Ganammyeon[48]), Kanghwado[19], Korangp'o, Kwangnŏng, Kyŏnggido[1] (=Kyungkido[49], Kyeongki Province[80]), Myŏngjisan[111] (=Mt. Myungji[23], Myeonji[82]), Osan[22], Seoul[52] (=Kyŏngsong[14]), Soyosan[50] (=Mt. Soyo[97]), Suwŏn[121], Taedŏksan[15] (=Mt. Taedeok[81]), Wangbangsan[51] (=Mt. Wangbang[98]); GN: Chirisan[65] (=Mt. Jiri[21], Mt. Chiri[106]), Ch'ŏnhwangsan, Kajisan, Kayasan (=Haeinsa Temple[29], Haein Temple[107]), Kŏjedo, Kŭmjŏngsan, Kyŏngsangnamdo[7] (=Kyeongnam Province[103]), Masan, Namhaedo, Wŏnhyosan, Yokchido; GW: Ch'iaksan (=Mt. Chiaksan[54], Mt. Chi-aksan[57], Mt. Chiak[99]), Chŏmbongsan (=Mt. Chŏmbong[115]), Ch'ŏrwŏn[40] (=Cheolweon[89]), Hwach'ŏn[41] (=Whacheon[90]), Hyangnobong[46], Imgye-myŏn (=Imgye-myeon[70]), Kangwŏndo[11] (=Kangweon Province[79]), Kŏnbongsan[47] (= Keonbong[95]), Kyebangsan, Obongsan[67] (=Mt. Obong[96]), Odaesan[25] (=Odae[86]), Pangsan-myŏn[43] (=Pangsan Myeon[92]), Sangbaechae, Sogŭmgang[120] (=Sogumgang[24], Sogeumgang[87], Mt. Sokeumgang[85]), Sŏhwa[45] (=Seowha[94]), Sŏraksan (=Mt. Seolaksan[31], Mt. Seolak[84], Mt. Sŏrak[114]), Taeamsan[44] (=Mt. Taeam[93]), T'aebaeksan[55] (=Mt. T'aebaek[119], Mt. Taebaek[100]), Tosolsan (=Mt. Dosol[118]), Yanggu[42] (=Yangku Myeon[91]); HH: Hwanghaedo[8] (=Whanghae Province[78]); HN: Hamgyŏngnamdo (=Hamkyŏngnamdo[12], Hamnam Province[75]); JB: Chŏllabukto[4], Naejangsan[37], Tŏgyusan (=Mt. Teokyusan[68]); JJ: Chejudo[122] (=Cheju Is.[33], Cheju island[113], Cheju[108]), Ch'ujado, Hallasan (=Mt. Halla[116]); JN: Chogyesan (=Mt. Jogyesan[69]), Chŏllanamdo[5], Ch'ŏpto, Mokp'o[18], Paegyangsan[38], Sunch'ŏn (=Suncheon[60]), Taehuŏksando (= Taehuksando Is.[118]), Yŏsu (=Yeosu [62]); PB: Myohyangsan (=Mt. Myŏko[20], Mt. Myohyang[77]), P'yŏnganbukto[10] (=Pyeongpook Province[74]); PN: P'yŏngannamdo[9] (=Pyeongnam Province[73]), P'yŏngyang[13] (=Pyeongyang[76]).

Distribution. Korea (North, Central, South, Chejudo, Ullŭngdo), China (whole, Taiwan), Japan (Hokkaido, Honshu, Kyushu, Shikoku), Mongolia, C.I.S. (Altai Mts., Armenia, Azerbaijan, Belorussia, Estonia, Georgia, Kazakhstan, Khabarovsk Territory, Kirghizia, Kuril, Latvia, Maritime Territory, Moldavia, M. & W. Siberia, Uzbekistan), Tropical Asia, Europe.

Host plant. Apple (*cf.* Ko, 1969; Esaki & Ito, 1954), barley (*cf* Esaki & Ito, 1954; Kor. Soc. Plant Prot., 1972), caltha (*cf.* Marchand, 1953), *Carex* spp. (*cf.* Marchand, 1953), *Chrysanthemum* spp. (*cf.* Kor. Soc. Plant Prot, 1972), chinese cabbage (*cf.* Kor. Soc. Plant Prot, 1972), *Citrus* spp. (*cf.* Esaki & Ito, 1954; Kor. Soc. Plant Prot., 1972), cotton (*cf.* Esaki & Ito, 1954; Lee & Kown, 1977), *Ficus carica* (*cf.* Kor. Soc. Plant. Prot., 1972, 1986), *Glycine* spp. (*cf.* Esaki & Ito, 1954; Kor. Soc. Plant Prot, 1954), *Juncus* spp. (*cf.* Müller, 1942; Morcos, 1953; Kor. Soc. Plant Prot., 1972), *Juglans* spp. (*cf.* Kor. Soc. Plant Prot., 1972), maize (*cf.* Kor. Soc. Plant Prot, 1972), *Mentha* spp. (*cf.* Kor. Soc. Plant Prot., 1972), *Morus* spp. (*cf.* Esaki & Ito, 1954; Ko, 1969), oats (cf. Kor.

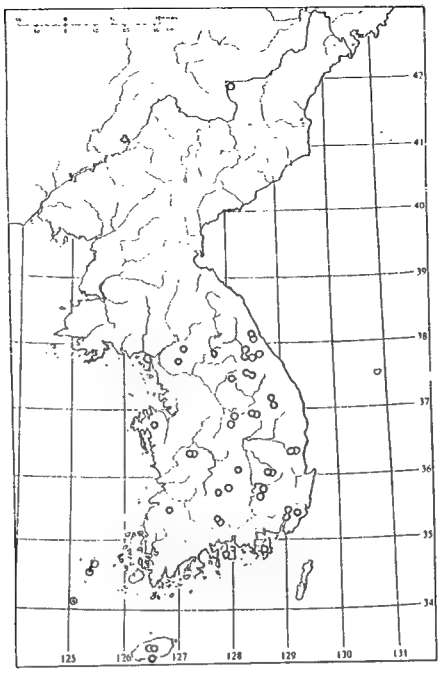

Fig. 24. Distribution map of *Kolla atramentaria* (○: locality based on the specimen examined, ○: locality reported previously, ♧: Chinese new record).

Soc. Plant Prot., 1972); peach (*cf.* Esaki & Ito, 1954), persimon (*cf.* Kor. Soc. Plant Prot., 1972), potato (*cf.* Esaki & Ito, 1954; Kor. Soc. Plant Prot., 1972), *Prunus* spp. (*cf.* Esaki & Ito, 1954; Ko, 1969), pumpkin, *Pyrus serotina* (Ko, 1969; Kor. Soc. Plant Prot., 1972), reddish (*cf.* Kor. Soc. Plant Prot., 1972), red been (*cf.* Esaki & Ito, 1954; Kor. Soc. Plant Prot., 1972), reed (*cf.* Esaki & Ito), rice (*cf.* Okamoto, 1924; Esaki & Ito, 1954; Ko, 1969), *Rosa* spp. (*cf.* Ko, 1969; Kor. Soc. Plant Prot., 1972), rye (*cf.* Kor. Soc. Plant Prot., 1972), *Salix* spp. (*cf.* Kor. Soc. Plant Prot., 1972), *Scirpus* spp. (Müller, 1942), sugar beet (*cf.* Esaki & Ito, 1954; Kor. Soc. Plant Prot., 1972), sweet potato (*cf.* Kor. Soc. Plant Prot., 1972, 1986), *Thea sinensis* (*cf.* Kor. Soc. Plant Prot., 1972, 1986), *Trifolium* spp. (*cf.* Kor. Soc. Plant Prot., 1972, 1986), wheat (*cf.* Kor. Soc. Plant Prot., 1972, 1986).

Genus 13. *Kolla* Distant, 1908 줄친말매미충속

Kolla Distant, 1908: 223.

Type-species. *Kolla insignis* Distant, 1908 (India).

39. *Kolla atramentaria* (Motschulsky, 1859) 줄친말매미충 (Fig. 24)

Tettigdnia atramentaria (sic) Motschulsky, 1859: 503 (Amur).

Tettigonia semiglauca Lethierry, 1876: 82 (Maritime territory).

Euacanthus angustatus Uhler, 1896: 293 (Siberia).

Ishidaella flaveola Matsumura, 1915: 157, 171-172 (Korea).

Ishidaella albomarginata (nec Signoret)+*Ishidaella flaveola:* Matsumura, 1915: 157, 171-172, 183[1].

Kolla lukjanovitshi Kusnezov, 1929: 172 (Trans Baikalia).

Ishidaella albomarginata (nec Signoret): Matsumura, 1931: 1257 (Korea). ——: Kamijo, 1933: 56[2].

—: Ishihara, 1953: 16. pl. 14(2) (Korea). —: Ishihara, 1966: 35 (Korea). —: Vilbaste, 1968: 120 (Korean peninsula). —: Hyun et Woo, 1969: 165[4]. —: Ko, 1969: 17 (Korea).

Kolla hyalina Kato, 1932: 223 (Manchuria).

Kolla mandschurica Jacobi, 1943: 27, fig. 6 (Manchuria).

Amblycephalus albomarginatus (nec Signoret)+Amblycephalus flaveolus: Esaki et Ito, 1954: 6-8, 12[3].

Cicadella albomarginata (nec Signoret): Lee, 1963: 240 (Korea).

Tettigella semiglauca+Ishidaella albomarginata (nec Signoret)+*Ishidaella flaveola:* Metcalf, 1965: 139-141, 463-466 (Korea).

Tettigoniella albomarginata (nec Signoret): Kuoh, 1966: 63-64, fig. 46 (Korea).

Tettigonia albomarginata (nec Signoret): Ishihara, 1967, Ibid. 9(3): 68 (Korea).

Ishidaella albomarginata (nec Signoret)+*Ishidaella flaveola:* Zool. Soc. Kor., 1968: 29 (Korea).

Kolla atramentaria: Ishihara, 1971: 17 (Korea). —: Kim et Kim, 1971: 150[5-6]. —: Kor. Soc. Plant Prot., 1972: 124 (Korea). —: Kwon, 1983: 16[28]. —: Kim *et al.*, 1985: 98[31]. —: Kor. Soc. Plant Prot., 1986: 153 (Korea). —: Anufriev et Emel'yanov, 1988: 100-101 (Korean peninsula). —: Morimoto, 1989: 100 (Korean peninsula). —: Kwon et Huh, 1994: 86 (Korea).

Kolla albomarginata (nec Signoret): Emel'yanov, 1972: 133 (Korean peninsula).

Cicadella atramentaria+Cicadella flaveola: Nast, 1972: 250 (Korean peninsula).

Kolla atramentaria+Kolla hyalina+Tettigella flaveola: Lee et Kwon, 1977: 83-84[6-14].

Kolla atramentaria+Kolla hyalina: Lee, 1979: 153[15-16].

Kolla semiglauca+Kolla hyalina+Kolla flaveola: Lee et Kwon, 1979: 316-320, pl. 20, figs. 97(a-b), 98(a-c), 203-208, app. 842-844[14,17-27].

Kolla semiglauca: Kim et Nam, 1984b: 311[29].

Kolla hyalina: Lee *et al.*, 1985: 368[30].

Ishidaella flaveola: Ra *et al.*, 1987: 206[32-34].

Kolla hyalina: Kim, 1993: 298[35].

Locality. CB: Choryŏng (=Choryeong barriers[16]), Wŏraksan (=Mt. Wolak[15]); CN: Kyeryongsan, Tŏksungsan; GB: Ch'ŏngoksan, Chuwangsan (=Mt. Chuwang[31]), Hwangaksan, P'algongsan (=Mt. P'algong[23], Mt. Palgongsan[9]), Samsan[14], Sobaeksan[11] (=Mt. Sobaek[20]), Taegu[24] (=Kyungpook Univ. Campus[7]); GG: Kanghwado, Kwangnŏng, Soyosan; GN: Changan, Chirisan[10] (=Mt. Chiri[22], Mt. Jiri[4]), Kayasan[2] (=Haeinsa Temple[12], Mt. Kaya[21], Haein Temple[25]), Kŏjedo, Kŭmjŏngsan, Namhaedo, Wŏnhyosan; GW: Ch'iaksan, Kariwangsan, Nae-myŏn, Obongsan, Odaesan[6] (=Mt. Odae[19]), Pangdaesan, Sogŭmgang[5], Sŏraksan (=Mt. Seolaksan[8], Mt. Seolak[18], Mt. Sŏrak[29]), T'aebaeksan; HB: Paektusan (= Berg Chohaku[1], Mt. Chohaku[3], Mt. Paekdu[27]); JB: Naejangsan, Tŏgyusan; JJ: Chejudo[35] (=Is. Jejudo[28]), Chungmun, Hallasan (=Mt. Halla[30], Kwaneumsa Temple[13], Kwaneum Temple[26]); JN: Hat'aedo (=Hataedo[33]), Sohŭksando (=Sohuksando Is.[34]), Yŏngsando[32]; China: 5 ind., Jian, Jilin, 5, VII, 1993.

Distribution. Korea (North, Central, South, Chejudo), China (Northeast, Jilin: new record), Japan (Hokkaido, Honshu, Kyushu, Shikoku), C.I.S. (Kuril, Maritime Territory, Siberia).

Host plant. Aralia spp. (*cf.* Kor. Soc. Plant Prot., 1972, 1986), *Citrus* spp. (*cf.* Esaki & Ito, 1954; Ko, 1969), cotton (*cf.* Esaki & Ito, 1954; Lee & Kwon, 1977), foxtail millet (*cf.* Kor. Soc. Plant Prot., 1972, 1986), grape-vine (*cf.* Esaki & Ito, 1954; Ko, 1969), *Glycine* spp. (*cf.* Kor. Soc. Plant Prot., 1972, 1986), *Morus* spp. (*cf.* Ko, 1969; Kor. Soc. Plant Prot, 1972), *Patalis japonicus* (*cf.* Kor. Soc. Plant Prot, 1972, 1986), *Quercus* spp. (*cf.* Esaki & Ito, 1954; Ko, 1969), rice (*cf.* Esaki & Ito, 1954; Lee et Kwon, 1977), *Rosa* app. (*cf.* Esaki & Ito, 1954; Ko, 1969), sugar cane (*cf.* Kor. Soc. Plant Prot, 1972), wistaria (*cf.* Esaki et Ito, 1954; Ko, 1969).

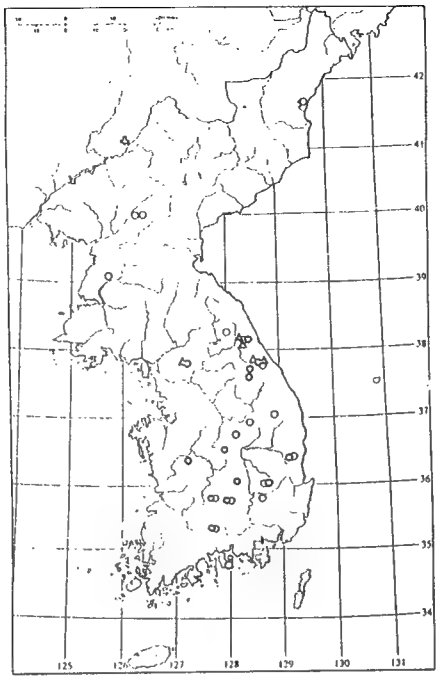

Fig. 25. Distribution map of *Mileewa*(black: locality based on the specimen examined, blank: locality reported previously; ○: *E. dorsimaculata*, △: *M. ussurica*, ♧: Chinese new record of *M. dorsimaculata*).

5) Tribe Mileewanini Evans, 1947 제비말매미충족

Genus 14. *Mileewa* Distant, 1908 제비말매미충속 (Fig. 25)

Mileewa Distant, 1908: 238.

Type-species. *Mileewa margheritae* Distant, 1908 (Assam).

Bolinlila Distant, 1910: 234.

Type-species. *Bolinlila rhodesiana* Distant, 1910 (Rhodesia).

Tylozygoides Matsumura, 1912: 42.

Type-species. *Tylozygoides artemisae* Matsumura, 1912 (Formosa).

Faenius Distant, 1918: 14.

Type-species. *Faenius lynchi* Distant, 1918 (India).

Angulus Distant, 1918: 98.

Type-species. *Angulus typicus* Distant, 1918 (India).

Key to species of *Mileewa*

1. Dorsum with metalic dark bluish to black markings. Scutellum yellow. Male pygofer without spines at caudal margins (subgenus *Mileewa*) ····· *dorsimaculata*
− Dorsum and scutellum with reddish brown to orange brown markings. Male pygofer with several denticulate spines at caudal margins (subgenus *Elemia*) ····· *ussurica*

Subgenus *Elemia* Anufriev et Emel'yanov, 1988 쑥제비말매미충아속

Elemia Anufriev et Emel'yanov, 1988: 99.

Type-species. *Mileewa ussurica* Anufriev, 1971 (Maritime Territory).

40. *Mileewa (Elemia) ussurica* Anufriev, 1971 쑥제비말매미충

Mileewa ussurica Anufriev, 1971: 517-518 (Maritime Territory). ——: Kwon, 1983: 17[1]. ——: Kwon et Huh, 1994: 86 (Korea).

Locality. GG: Kwangnŭng; GW: Odaesan[1], Sŏraksan.

Distribution. Korea (Central), C.I.S. (Maritime Territory).

Host plant. *Artemisia* sp. (Sŏraksan, 15, IX, 1984; *cf.* Kwon, 1983).

Subgenus *Mileewa* Distant, 1908 제비말매미충아속

Mileewa Distant, 1908: 238.

Type-species. *Mileewa margheritae* Distant, 1908 (Assam).

41. *Mileewa (Mileewa) dorsimaculata* (Melichar, 1902) 제비말매미충

Tettigonia dorsimaculata Melichar, 1902: 131 (Assam).

Mileewa margheritae Distant, 1908: 238, fig. 151 (Assam). ——: Doi, 1934: 67[1]. ——: Esaki *et al*, 1938: 79, pl. 34, fig. 136(2) (Korea). ——: Esaki, 1950: 284, fig. 755 (Korea). ——: Ishihara, 1953: 17. pl. 15, fig. 1 (Korea). ——: Hasegawa, 1954: 755 (Korea). ——: Esaki et Ito, 1954: 25 (Korea). ——: Lee, 1963: 240 (Korea). ——: Metcalf, 1965: 301-302 (Korea). ——: Ishihara, 1965a: 123, pl. 62(4) (Korea). ——: Hyun et Woo, 1969: 165[2]. ——: Chu, 1969: 42 (North Korea). ——: Lee, 1971: 13[3-4]. ——: Kor. Soc. Plant Prot., 1972: 125 (Korea). ——: Nam et Kim., 1982: 127[22].

Tylozygoides artemisiae Matsumura, 1912: 43-44 (Japan). ——: Matsumura, 1915: 157, 183 (Korea).

Mileeva margheritae (sic): Ishihara, 1965b: 216 (Korea).

Mileewa margheritae+*Tylozygoides artemisiae:* Zool. Soc. Kor., 1968: 29 (Korea).

Mileewa dorsimaculata: Vilbaste, 1968: 120 (Korean peninsula). ——: Emel'yanov, 1972: 135 (Korean peninsula). ——: Dworakowska, 1973: 420[5-7]. ——: Lee et Kwon, 1977: 84-85[4,8-13]. ——: Anufriev, 1978: 59 (Korean peninsula). ——*Mileewa dorsimaculata:* Kwon, 1983: 17 (Korea). ——*Mileewa dorsimaculata*: Kim *et al*., 1985: 98[24]. ——*Mileewa dorsimaculata:* Morimoto, 1989: 100 (Korean peninsula).

Mileeva dorsimaculata (sic): Nast, 1972: 252 (Korean peninsula). ——: Lee et Kwon, 1979: 323, pl. 21, figs. 101(a-b), 213-216, app. 850-851[9,14-20]. ——: Lee, 1979: 153[21]. ——: Kim et Nam, 1984b: 311[23]. ——: Kor. Soc. Plant Prot., 1986: 154 (Korea). ——: Park *et al*., 1988a: 166[25].

Mileewa (Mileewa) dorsimaculata: Anufriev et Emel'yanov, 1988: 99 (Korean peninsula). ——: Kwon et Huh, 1994: 86 (Korea).

Locality. CB: Choryŏng (=Choryeong barrier[21]), Songnisan; CN: Kyeryongsan; GB: Ch'ŏngoksan, Chuwangsan (=Mt. Chuwang[24]), Hwangaksan, P'algongsan (=Donghwasa Temple[3], Mt. Palgong[19]), Sobaeksan[10] (=Mt. Sobaek[16]), Taegu[18] (=Kyungpook Univ. Campus[4], Samsan[9]); GG: Yongmunsan; GN: Chirisan (=Mt. Chiri[17], Mt. Jiri[2], Piagol valley[22]), Kayasan (=Haeinsa Temple[8], Haein Temple[20]); GW: Kyebangsan, Odaesan[11] (=Mt. Odae[15]), Sangbaechae, Sŏraksan[23] (=Mt. Seolaksan[12], Mt. Seolak [14]), Taeamsan[25]; HB: Kyŏngsŏng (=Onpho-ri Distr. Kjŏng-sŏng[6]); JB: Tŏgyusan (=Mt. Teokyusan[13]); PB: Myohyangsan (=valley Hapiro Distr. Hjangasan[5], Mjohjang-san[7]); PN: P'yŏngyang[1]; China: 4 ind., Jian, Jilin, 5, VII, 1993, on *Artemisia* sp.

Distribution. Korea (North, Central, South), China (Jiangxi, Fujian, Jilin: new record, Taiwan), Japan (Hokkaido, Honshu, Kyushu), C.I.S. (Maritime Territory), Burma, India (Assam), Java.

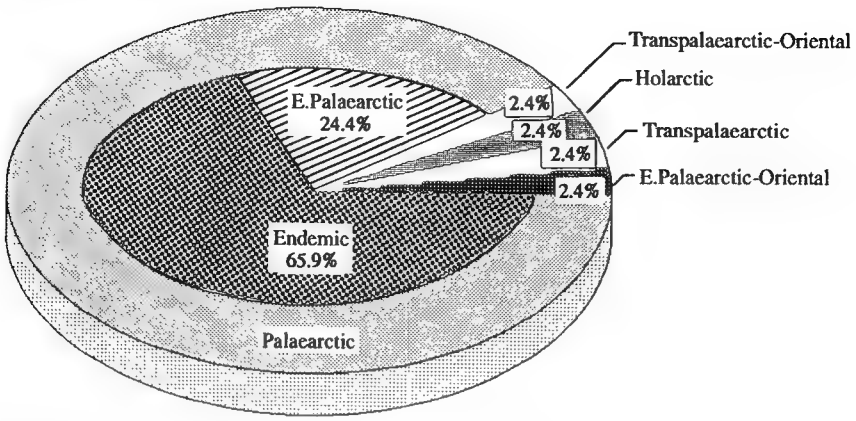

Fig. 26. Zoogeographic components of the Korean Cicadellinae.

Host plant. *Artemisia* sp. (Ch'ŏngoksan, 7, VIII, 1991; Sangbaechae, 10, VIII, 1991; Tŏgyusan, 19, VI, 1993; *cf.* Eski et Ito, 1954: Kor. Soc. Plant Prot., 1972)

ZOOGEOGRAPHY

1. Conspectus

Although Cicadellinae incorporate taxa from all of the zoogeographical regions of the world, it may be variable according to the constituent tribes. Generally the Cicadellini is cosmopolitan and xylem feeders. The subtribe Cicadellina seems mostly abundant in Neotropical region. Whereas, the subtribe Bothrogoniina may be apparenetly Oriental and Afrotropical origin, and the northern limit in the distribution should be Northeast China. The Evacanthini is usually distributed in Holarctic and Oriental regions. On the contrary, The Mileewanini is rich in species from the both Ethiopian and Oriental regions, nevertheless, a few species are represented in the Neotropical and East Palaearctic regions. And the northern limit in the distribution seems to be the Russian Far East.

But, the geographical distribution of Pagaroniini shows a very peculiar tendency. In the distiributional range, the known species of this tribe are limited only to the North Pacific peripheral areas such as Korea, Northeast China (new record), Japan, Russian Far East (Maritime Territory, Kuril, Sakhalin), and Pacific states of North America. Thus, also this distributional condition supports a good evidence treating it as a separate tribe. Furthermore, the *Pagaronia* has been known to consist of a total of 58 species in the world. Among them only 4 species are occur in North America, and the rest 54 species are represented from Far East Asia.

In case of the Asiatic species, 31 species are only known to be endemic to Japan and 23 species endemic to Korea, respectively. Out of these species, *Pagaronia continentalis* commonly occurs in the Korean peninsula proper, Northeast China (Heilongjiang, Jilin: new record), and Russian Maritime Territory, whereas *P. aurantia* commonly occurs in North Japan and Russian Kuril.

On the other hand, the Errhomenini is represented from Holarctic region: North Pacific area (N. America, Japan, Korea, China, and Russian Maritime Territory), Europe, and West Asia in Palaearctic region (Kazakhstan, Turkey *etc.*). As for the Korean fauna, 2 genera (*Malmaemichungia, Bannalgaechungia*) are endemic, and the only remaining genus *Diodontophorus* gen. nov. occurs in common with Japan.

2. Pattern analysis

In general, the distributional pattern of Korean Cicadellinae may be fallen into the following zoogeographical factors. These do not necessarily reflect the exact range of each species, but merely their presence or absence in the larger area scheme (Fig. 26).

1. Holarctic type: 1 species (2.4%)
   E. interruptus: according to Hamilton (1983), there have been recent evidence that, this Transpalaearctic species had been introduced to N. America.
2. Transpalaearctic type: 1 species (2.4%)
   E. acuminatus: a very common species having one of the largest population in the grasslands of these areas.
3. Transpalaearctic-Oriental type: 1 species (2.4%)
   Cicadella viridis.
4. E. Palaearctic type: 10 species (24.4%)
   Evacanthus ogumae, Onukia onukii, Bathysmatophorus schabliovskii, Diodontophorus koreanus, Epiacanthus stramineus, Pagaronia continentalis, Kurotsuyanus sachalinensis, Bothrogonia japonica, Kolla atramentaria, Mileewa ussurica.
5. E. Palaearcitc (Trans-Far East Asia) - Oriental type: 1 species (2.4%)
   Mileewa dorsimaculata.
6. Endemic: 27 species (65.9%)
   Diodontophorus koreanus, Bannalgaechungia alticola, Bannalgaechungia hanlasana, Koreotettix parvus, Malmaemichungia brachycephala, Pagaronia chejuensis, P. geojedoensis, P. heuksanensis, P. jungsukae, P. naejangsana, P. pallida, P. seolagsana, P. silvatica, P. similis, P. taeamsana, P. umbratica, P. whangaksana, P. bifurcata, P. diversa, P. elegans, P. evansi, P. hallasana, P. hamata, P. jirisana, P. koreana, P. maculipennis, P. seungmoi.

As presented by the previous zoogeographic analysis, Korean cicadelline leafhoppers are mostly originated from the Palaearctic elements, along with several Nearctic and Oriental factors. Most of the species (95.1%) occur in the boreal region, and 27 species (65.9%) of them have been known hitherto to be endemic to Korean peninsula only (Table 2).

Among the above zoogeographical types, the E. Palaearctic type can be further divided into the several subregions:

1) Trans Far East Asia subtype (Korea - N. E. China - Russian Maritime Territory - Japan): *Onukia onukii, Kolla atramentaria., Bathysmatophorus schabliovskii.*
2) Continental Far East Asia subtype (Korea - N. E. China - Russian Maritime Territory): *Pagaronia continentalis.*
3) Korea - Russian Maritime Territory subtype: *Mileewa ussurica, Evacanthus ogumae.*
4) Korea - Japan subtype: *Diodontophorus koreanus, Kurotsuyanus sachalinensis.*
5) Korea - Japan - N. E. China subtype: *Bothrogonia japonica.*
6) Korea - Japan - Russian Maritime Territory subtype: *Epiacanthus stramineus.* This may be fallen into the first subtype, due to the insufficient survey in N. E. China.

In the domestic distribution, the majority of this subfamily are very commom species with variously recorded localities. In contrast to these species, most of *Pagaronia* species, except for a few species, are limited in a very narrow ranged habitat of the domestic local distributions. The following only 4 out of 23 species of *Pagaronia* are relatively common, taking several localities: *P. continentalis, P. geojedoensis, P. silvatica and P. whangaksana.*

Thus, the evolutionary progress in the distributional pattern of the genus *Pagaronia* should be

Table 2. Distributional trend of the Korean Cicadellinae.

Species	Korea					China					Japan					C.I.S.			Mongolia	Europe	Oriental	Nearctica	N.Africa
	North	Central	South	Chejudo	Ulleungdo	North	Central	South	Northeast	Taiwan	Hokkaido	Honshu	Kyushu	Shikoku	Ryukyus	Europe	Siberia	Far East					
E. acuminatus	+	+	+	+						+		+				+	+	+	+	+			
E. interruptus	+	+	+	+			+		+		+	+	+	+		+	+	+	+	+		+	+
E. ogumae	+	+	+	+														+					
O. onukii	+	+	+	+					+		+	+	+	+				+					
B. schabliovskii	+								+		+						+						
D. japonicus		+	+									+											
D. koreanus		+																					
B. alticola		+																					
B. hanlasana				+																			
K. parvus			+																				
M. brachycephala		+																					
E. stramineus	+										+	+		+				+	+				
K. sachalinensis			+									+	+						+				
P. chejuensis				+																			
P. continentalis	+	+	+		+				+										+				
P. geojedoensis		+	+	+																			
P. heuksanensis			+																				
P. jungsukae			+																				
P. naejangsana			+																				
P. pallida			+																				
P. seolagsana		+																					
P. silvatica			+																				
P. similis		+																					
P. taeamsana		+																					
P. umbratica		+																					
P. whangaksana			+																				
P. bifurcata		+																					
P. diversa		+																					
P. elegans		+																					
P. evansi			+																				
P. hallasana				+																			
P. hamata		+	+																				
P. jirisana			+																				
P. koreana	+																						
P. maculipennis		+																					
P. seungmoi			+																				
B. japonica	+	+	+	+					+			+	+	+									
C. viridis	+	+	+	+	+	+	+	+	+	+	+	+	+	+		+	+	+	+	+	+		
K. atramentaria	+	+	+	+					+		+	+	+	+			+	+					
M. dorsimaculata	+	+	+				+		+	+	+	+	+					+			+		
M. ussurica		+																+					

Table 3. Some life history data for Korean Cicadellinae.

Species	Number of generations per year	Overwintering stage			Time of adult appearance											
		Egg	Nymph	Adult	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
E. acuminatus		+								+	+	+	+			
E. interruptus		+								+	+	+	+			
E. ogumae		+								+	+	+	+			
O. onukii										+	+	+	+	+		
B. schabliovskii										+	+					
D. japonicus	1								+	+	+	+				
D. koreanus	1								+	+	+					
B. alticola	1										+	+				
B. hanlasana	1									+	+	+				
K. parvus	1								+							
M. brachycephala	1								+	+	+					
E. stramineus																
K. sachalinensis	1								+	+	+	+				
P. chejuensis	1								+							
P. continentalis	1								+	+	+					
P. geojedoensis	1								+	+	+	+				
P. heuksanensis	1									+						
P. jungsukae	1									+						
P. naejangsana	1									+						
P. pallida	1								+	+						
P. seolagsana	1									+	+	+				
P. silvatica	1								+	+	+	+				
P. similis	1									+						
P. taeamsana	1										+					
P. umbratica	1											+				
P. whangaksana	1									+						
P. bifurcata	1									+						
P. diversa	1									+						
P. elegans	1									+						
P. evansi	1								+	+						
P. hallasana	1								+	+	+	+				
P. hamata	1									+						
P. jirisana	1										+					
P. koreana	1										+					
P. maculipennis	1											+				
P. seungmoi	1								+	+	+					
B. japonica	1			+					+	+	+	+	+			
C. viridis	1-3	+						+	+	+	+	+	+	+	+	
K. atramentaria	4(?)	+(?)						+	+	+	+	+				
M. dorsimaculata										+	+	+	+			
M. ussurica													+			

very characteristic than those of other genera, and more species will be found according to the special local habitat, seasonal timing and different host plant in different domestic areas.

ECOLOGY

The ecology of cicadelline leafhoppers has been hardly known in Korea, and the information on the life history still awaits for extensive survey (Table 3). However, synchronous with growing period of plants, the adult stage of most species generally occur May to October in Korea, with only a few exceptions.

Cicadella viridis, one of the common and polyphagous Transpalaearctic species, is known to occur April to November and usually having 3 generations annually in China (Kuoh, 1966), while it is recorded as univoltine from June to October in Swedish condition. Also, this species is known to hibernate in the egg stage in Europe. The female makes long slits with its ovipositor in the stem of *Juncus effusus* where the eggs are laid (Morcos, 1953).

The adult of *Bothrogonia japonica*, the largest cicadelline leafhoppers in the Far East, appears once a year and at the beginning of September new adults emerge again, and then hibernates as the same stage on trees (Ishihara, 1962).

Most of the *Evacanthus* species are grass-feeders and the adults appear in June to September. Kwon (1983) recorded the host plants of both *Evacanthus interruptus* and *E. acuminatus* as Compositae in Korea. In England, *E. interruptus* has been recorded from hops (*Humulus lupulus*), and the overwintering eggs may be laid in the cracks of dead wood (Massee, 1943). While, this species is reported as feeding on the Asteraceae-plants in Japanese mountains (Ishihara, 1953). Also, *E. acuminatus* is reported inhabiting in sphagnous spruce wood and rich swampy wood in Europe (Linnavuori, 1952).

The biology of *Pagaronia* is scarcely known, and the species may be inhabitants of shady and rather damp forest. Kwon (1983) reported their hosts as latifoliates in shady forest. In Japan, *P. uesumii* and *P. odaii* were found on *Prunus mume* (cf, Okada, 1976), and *P. maculiceps* on Compositae and Polygonaceae *etc.*, at peripheries of deciduous broad-leaved forests (Hayashi et Arai, 1990).

In occasion, a few cicadelline species are known as parasitised in various stages by Hymenoptera and Diptera. Among them, some eggs of *Cicadella viridis* were found as parasitised by hymenopteran parasitoids such as *Tetrastichus* sp., *Anagrus silwoodensis* and *A. mutans* in England (Freytag, 1985).

ECONOMIC IMPORTANCE

Some cicadelline species are known as pests of agricultural crops, vegetables, and fruit trees etc., and also attack various kinds of trees and shrubs in forest (Table 4).

Particularly, *Cicadella viridis* seems very common in everywhere and injurious to many plants of various kinds. In spite of having the normal breeding plants and food plants such as wild rushes, sedges and marsh grasses, this species is known as a pest on various fruit trees, *Sorghum*, rice, wheat, sugar-cane, sugar-beat, corn, *Phaseolus*, cabbage, *Alnus*, *Betula*, and *Salix* in many countries including Korea, China, Japan, France, Bulgaria, Germany, once also in Finland (on cabbage). The damage is caused by the oviposition of females resulting in weakening and withering of plants (Schmutterer, 1953; Müller, 1956; Ossiannilsson, 1981).

Recently, Wilson and Claridge (1991) reported this species as a common rice pest in East Asia and Italy. In reality their normal host plants are species of *Juncus* and *Scirpus* (both sedges) but oviposition may occur in a variety of plants.

Table 4. Korean cicadelline pests injurious to crops, vegetables and trees

Species	Host	Selected reference
O. onukii	*Miscanthus sinensis, Miscanthus* spp.	Kor. Soc. Plant Prot, 1972, 1986; Kwon, 1983
D. japonicus	*Quercus Mongolicus, Quercus* spp	Kor. Soc. Plant Prot, 1972, 1986; Lee & Kwon, 1977; Kwon, 1983
D. koreanus	*Quercus Mongolicus, Quercus* spp.	Kor. Soc. Plant Prot, 1972, 1986; Lee & Kwon, 1977; Kwon, 1983
E. stramineus	barley, *Citrus* spp.	Esaki & Ito, 1954; Kor. Soc. Plant Prot, 1972, 1986
	bush clover, grape vine, *Paulownia* spp., *Salix* spp.	Esaki & Ito, 1954; Ko,1969; Kor Soc. Plant Prot., 1972, 1986
	broad bean plant, wheat	Esaki & Ito, 1954
B. japonica	berries, sugar cane, grape-vine	Esaki & Ito, 1954; Kor. Soc. Plant Prot., 1972, 1986
	Cercis chinensis	For. Adm. For. Res. Inst., 1991
	Citrus spp., *Firmiana* spp., *Morus* spp., *Paulownia* spp.	Esaki & Ito, 1954; Ko, 1969; Kor. Soc. Plant Prot., 1972, 1986
	Morus japonica, Prunus persica,	Ko, 1969; Kor. Soc.
	Pyrus spp., *Rubus* spp.	Plant Prot, 1972
	pear	Esaki & Ito, 1954
	Thea sinensis	Esaki & Ito, 1954; Kor. Soc. Plant Prot, 1972
	Aralia cordata, barley, *Eriobotrya japonica, Glycine* spp., oats, *Olea erropaea,* persimon, *Petasites japonicus, Quercus* spp., red bean, rye, wheat, wistaria	Kor. Soc. Plant Prot, 1972, 1986
C. viridis	rice	Okamoto, 1924; Esaki & Ito, 1954; Ko, 1969; Kor. Soc. Plant Prot, 1972;
	cotton, *Glycine* spp. peach, reed	Esaki & Ito, 1954
	barley	Esaki & Ito, 1954; Kor. Soc. Plant Prot, 1972, 1986; Kwon & An, 1985
	Citrus spp., potato, red bean	Esaki & Ito, 1954; Kor. Soc. Plant
	sugar beet	Prot, 1972, 1986
	Pyrus serotia	Ko, 1969; Kor. Soc. Plant Prot, 1972, 1986
	Morus spp., *Prunus* spp.	Esaki & Ito, 1954; Ko, 1969; Kor. Soc. Plant Prot, 1972, 1986
	chinese cabbage, *Chrysanthemum* spp., *Ficus caria, Juglaus* spp., maize, *Mentha* spp., oats, persimon, raddish, *Rosa* spp., rye, *Salix* spp., sweet potato, *Thea sinensis, Trifolium* spp., wheat	Kor. Soc. Plant Prot., 1972
	Juncus spp.	Müller, 1942; Kor. Soc. Plant Prot., 1972, 1986
	pumpkin	new record
K. atramentaria	*Quercus* spp.	Esaki & Ito, 1954; Kor. Soc. Plant Prot, 1972, 1986;
	cotton plant, rice	Esaki & Ito, 1954
	Citrus spp., grape-vine,	Esaki & Ito, 1954; Ko, 1969;
	Morus spp., *Rosa* spp., wistaria	Kor. Soc. Plant Prot, 1972, 1986
	Aralia spp., chinese millet, *Glycine* spp., foxtail millet, *Petasites japonicus,* sugar cane	Kor. Soc. Plant Prot., 1972, 1986
M. ussurica	*Artemisia* spp.	Kwon, 1983
M. dorsimaculata	*Artemisia* spp.	Ishihara, 1953; Esaki & Ito, 1954, Kor. Soc. Plant Prot, 1972, 1986

Bothrogonia japonica usually attacks a lot of fruit trees and ornamental trees in Korea (For. Adm. For. Res. Inst., 1991). Also in Japan, this species injures various cultivated plants such as pear tree, mulberry tree, tea shrub, sugarcane and many kinds of berries *etc.* (Ishihara, 1962).

The species of *Mileewa* are recorded to feed on *Artemisia* (Ishihara, 1953; Esaki et Ito, 1954; Kor. Soc. Plant Prot, 1972 & 1986), and *Kolla atramentaria* is injurious to many crops and cultivated fruit trees. According to Okada (1976), *Pagaronia odai* is regarded as an injurious pest to the Japanese apricot, *Prunus mume* Sieb. et Zucc., making the leaves wither and the fruits drop when it attacks newly developing branches.

Esaki and Ito (1954), Ko (1969), and Kor. Soc. Plant Prot. (1972, 1986) recorded *Onukia onukii*, *Diodontophorus japonicus*, *D. koreanus* and *Epiacanthus stramineus* as pest status feeding on a number of crops and trees, but the damage seemed to be below the economic threshold for control in Korea.

On the other hand, some of the Cicadellinae have been investigated as virus vectors of the plant diseases, and it turned out that 27 species of 9 genera were capable to transmit the pathogens in the world (Nielson, 1985). So far, the 4 diseases known to be transmitted by the members of this group are 'chlorotic streak of sugarcane', 'phony peach', 'western x-disease', and 'Pierce's disease of grape' While as far as I know, there is no species of this group recorded as virus vectors in Korea.

The swollen structure of frontoclypeus and anteclypeus of these leafhoppers appear to be the outward manifestation of enlarged clypeal muscles which operate the pharyngeal pump. And, it permits these insects to suck sap strongly in the xylem tubes of plants (Oman, 1949; Young, 1968).

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韓國産 말매미충亞科의 系統分類學的 및 生物地理學的 硏究 (매미目: 매미충科)

許級葉 · 權容正

慶北大學校 農科大學 農生物學科

韓國産 말매미충류를 分類한 結果, 모두 5族 14屬 41種으로 밝혀졌다. 그 중에서 2新屬 *Diodontophorus* gen. nov. 및 *Koreotettix* gen. nov. 그리고 *Koreotettix parvus* gen. et sp. nov. *Pagaronia chejuensis* sp. nov. *P. naejangsana* sp. nov. *P. pallida* sp. nov. *P. similis* sp. nov. *P. taeamsana* sp. nov. *P. umbratica* sp. nov. *P. bifurcata* sp. nov. *P. diversa* sp. nov. *P. elegans* sp. nov., and *P. maculipennis* sp. nov. 등 11新種을 새로 추가하였다. 또한 *Bathysmatophorus koreanus*와 *B. japonicus*는 新屬 *Diodontophorus* gen. nov.로 變更 처리되었으며, 지금까지 誤同定되어 왔던 *Bathysmatophorus schabliovskii*는 북한에 실제로 분포하고 있음이 확인되었다. 分類群마다 檢索表를 작성하였고, 各種의 分布 및 寄主植物을 정리하였으며, 生物地理學的 特性을 分析하였다.

검색어 : 분류, 생물지리, 매미목, 말매미충과, 말매미충아과

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